AMIGOS IAS

JULY, 2026
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Economy
Science & Technology

Beyond the numbers: What NFHS 6 reveals about New India?

Spotlight

- Right to Walk is a Fundamental Right
- Indian Rupee Depreciation
- Dark Patterns
- India's Critical National Infrastructure
- Surface Ozone
- Impact of Menstrual Health on School Absenteeism

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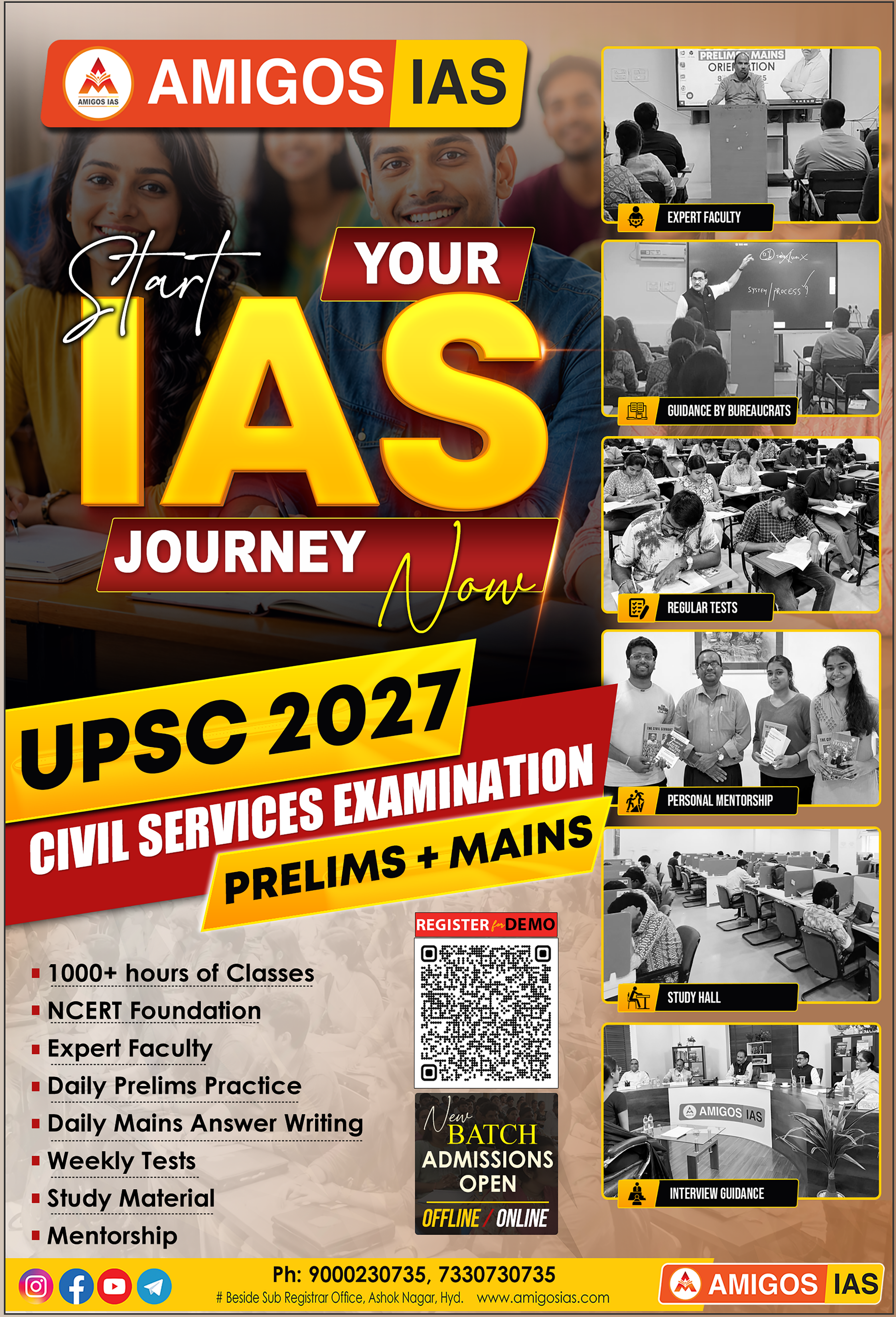

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Dear Readers,

For the Civil Services Examination, current affairs are not about collecting information. The exam tests how well you understand current developments and connect them with different dimensions of the syllabus. In essence, UPSC expects aspirants to develop awareness, conceptual clarity, analytical ability, and balanced perspectives through current affairs.

At Amigos IAS, our monthly magazine is designed to meet this demand. Every topic and MCQ is curated to help you move beyond reading the news towards developing an exam-oriented understanding.

The **Cover Story on *Beyond the Numbers: What NFHS-6 Reveals About New India*** examines one of India's most important evidence-based surveys for understanding the country's social and developmental transformation. Going beyond health indicators, it analyses demographic transition, maternal and child health, nutrition, women's empowerment, ageing, and human capital development, providing valuable insights into India's progress towards *Viksit Bharat 2047*.

This edition covers several important developments shaping governance, economy, technology, and global affairs. In **Polity and Governance**, topics such as **Online Gaming Regulation in India, Special Intensive Revision (SIR) of Electoral Rolls**, **Indian Sedition Law**, **AI in Courts**, and the **Right of Walk, a Fundamental Right** examine contemporary constitutional, legal, and governance challenges. **International Relations** covers India's evolving strategic engagements through the **India–Cyprus Strategic Partnership**, **India–Nepal relations**, **India–Russia RELOS**, and the **US–Iran Peace Framework Agreement**.

The **Economy** section discusses issues ranging from **India's Surging Power Demand**, **Coal Gasification**, **Critical National Infrastructure**, **Rupee Depreciation**, **Foreign Portfolio Investment and G-Sec Market Reforms**, to emerging concepts such as **Memflation**. **Science and Technology** explores developments in **Post-Quantum Cryptography**, **AI Information Agents**, **India's Semiconductor Ecosystem**, **FemTech Platforms**, and **Varya**, India's indigenous AI video generation model. The magazine also examines **Ecosystem-based**

Adaptation, **Surface Ozone**, **Drone Revolution and Modern Warfare**, **Urban Water Security**, and the growing impact of technology on governance and society.

The **Prelims Radar** section covers important species including **Conocarpus Species**, **Long-tailed Duskhawker**, **Nagaland Cascade Frog**, and **Indian Peafowl**; places in news such as **Kumbhalgarh Fort**, **Lake Chad Basin**, **Gilgit-Baltistan**, and **Zojila Tunnel**; organisations including **G7**, **QUAD**, **NATO**, and the **Asian Productivity Organisation**; important reports such as the **Sample Registration System Bulletin 2024**, **Planetary Vital Signs Report 2026**, **UNICEF Children's Climate Risk Report 2026**, along with key defence developments including **AMCA**, **Shukrayaan Mission**, **BrahMos Missile**, **Agni-1**, and many more.

We thank the Amigos IAS academic team, research team, and management for their continued support.

— Team Amigos IAS

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Beyond the numbers: What NFHS 6 reveals about New India?

Are our mothers healthier than they were a decade ago?

Are children receiving adequate nutrition?

Why are Indian families becoming smaller?

Is obesity replacing hunger?

Are women gaining greater control over their lives?

Can India convert its demographic dividend into human capital?

Are the schemes launched towards welfare showing any results?

And perhaps the most important question of all, is development truly reaching every household?

The **National Family Health Survey - 6,** released recently, provides answers to the above questions.

More Than a Health Survey, India's Social Mirror

Conducted across nearly **6.79 lakh households** in more than **715 districts** spanning every State and Union Territory for the year **2023-24,** NFHS-6 is among the world's largest demographic and health surveys. It examines far more than diseases or hospitals. It captures how Indians are born, how they grow, what they eat, how women participate in decision-making, how families access healthcare, whether children receive vaccinations, how sanitation has improved, how digital technology is reshaping lives, and how India's demographic profile is evolving.

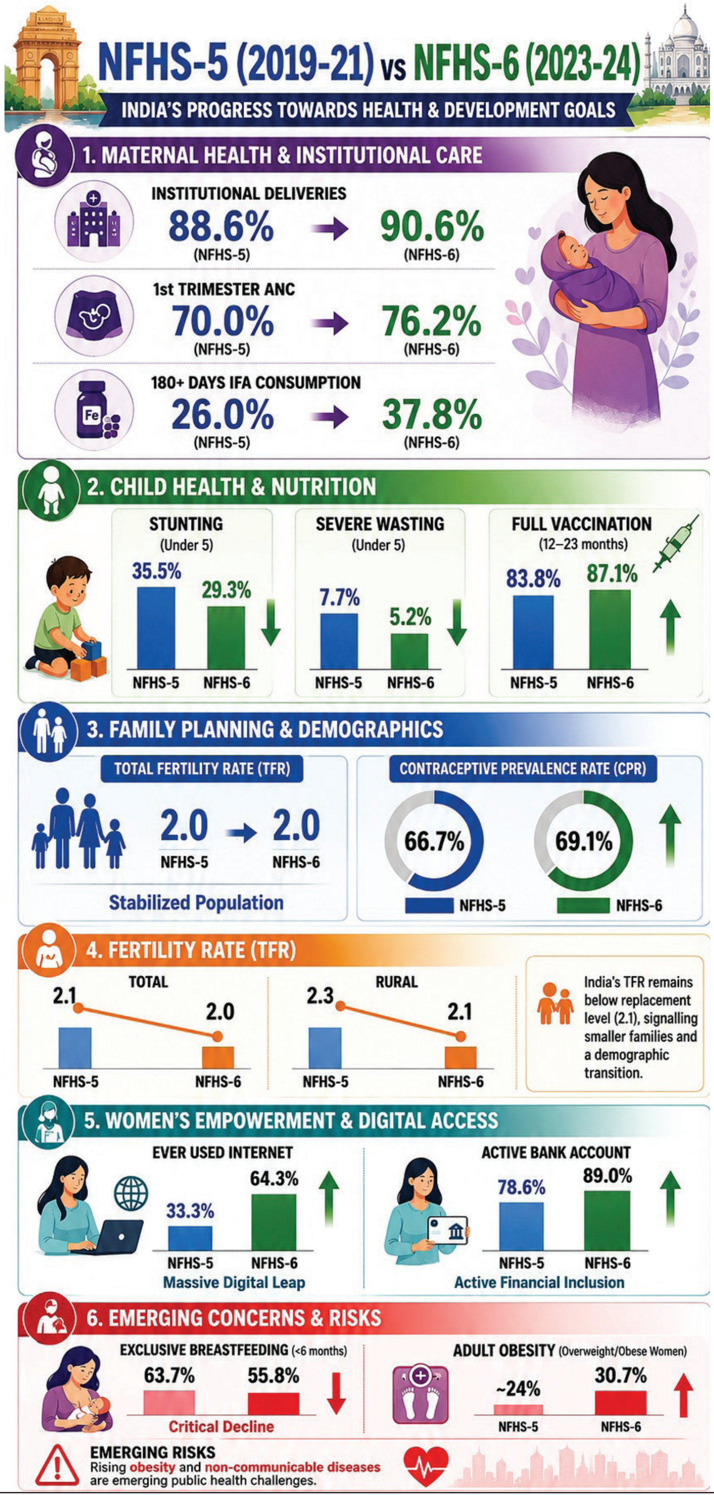
This makes NFHS indispensable for policymakers. While the Census tells us **how many Indians there are,** and GDP tells us **how the economy is performing,** NFHS reveals **how Indians** are actually living.

It is no coincidence that flagship programmes such as **Poshan Abhiyaan, Mission Indradhanush, Ayushman Bharat, Jal Jeevan Mission** and the **National Health Mission** majorly rely on NFHS findings to identify gaps and refine interventions. For administrators, the survey is a report card. For researchers, it is a rich evidence base.

The Quiet Revolution Inside Indian Homes (NFHS-6)

The transformation unfolding in India is not always visible in skylines or economic indicators, it is quietly taking place inside ordinary homes. Today, 98.3% of Indians live in households with electricity, while **96.5% have access to an improved source of drinking water,** reflecting the expanding reach of basic infrastructure. Financial security has also strengthened, with **98% of households owning a bank account,** enabling direct access to government benefits and formal financial services. At the same time, **nearly 60% of households are covered under a health insurance scheme,** indicating a gradual shift towards financial protection against medical emergencies.

The survey also reflects a society investing more in education. Nearly 46% of women and 54% of men have completed **10 or more years of schooling,** marking steady progress in educational attainment. Encouragingly, the proportion of women and men marrying before the legal age has declined, signalling changing social norms, greater educational opportunities and increasing awareness about the benefits of delayed marriage.



The New Indian Family: A Nation in Demographic Transition

For decades, policymakers viewed population growth as India's biggest challenge. Today, the concern has shifted from "How many Indians are there?" to "How healthy, skilled and productive are they?" NFHS-6 captures this transition with remarkable clarity.

One of the most significant findings is that **India's Total Fertility Rate (TFR) has stabilised at 2.0 children per woman,** remaining below the replacement level of 2.1. This indicates that Indian families are becoming smaller and there is a **change in priorities** of these families with parents investing more in education, nutrition and health care of each child with focus shifting from quantity to quality and from population growth to **human capital development.**

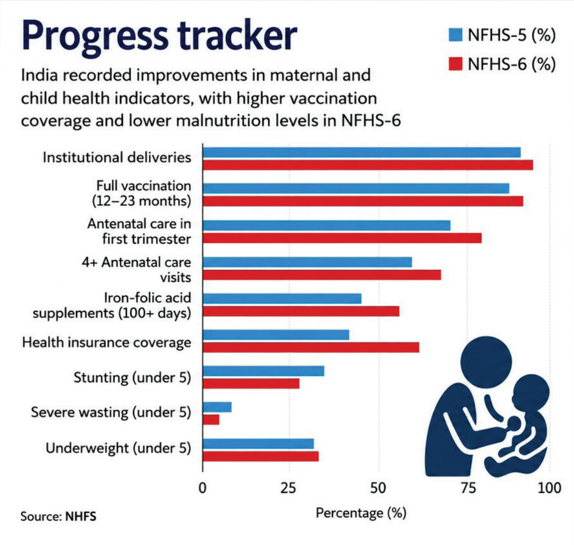
This demographic transition also brings a new reality, **India is ageing.** 12.9 % of the population age 60 years and above. With improvements in healthcare and life expectancy, the proportion of elderly citizens is steadily increasing. While this reflects developmental success, it also demands greater attention to geriatric healthcare, pension security, long-term care and protection against chronic diseases.

The Health Revolution, and the Unfinished Agenda

Over the past two decades, India has steadily strengthened its healthcare delivery system through initiatives such as the National Health Mission, Janani Suraksha Yojana, Mission Indradhanush and Ayushman Bharat. NFHS-6 suggests that these investments are beginning to yield tangible results.

Maternal healthcare has witnessed remarkable improvement. **Nearly 95.9% of pregnant women now receive antenatal care,** compared to 92.6% in NFHS-5. Early registration of pregnancy during the first trimester has increased from **70.0% to 76.2%,** while mothers receiving at least four antenatal check-ups have risen from **58.5% to 65.2%.** These improvements significantly reduce risks during pregnancy and childbirth.

Safe motherhood is becoming the norm rather than the exception. **Institutional deliveries have increased from 88.6% to 90.6%, and 91.3% of births are now attended by skilled health personnel.** Postnatal care within the first two days of birth has also improved considerably, ensuring better survival for both mothers and new-borns.



Progress tracker

India recorded improvements in maternal and child health indicators, with higher vaccination coverage and lower malnutrition levels in NFHS-6

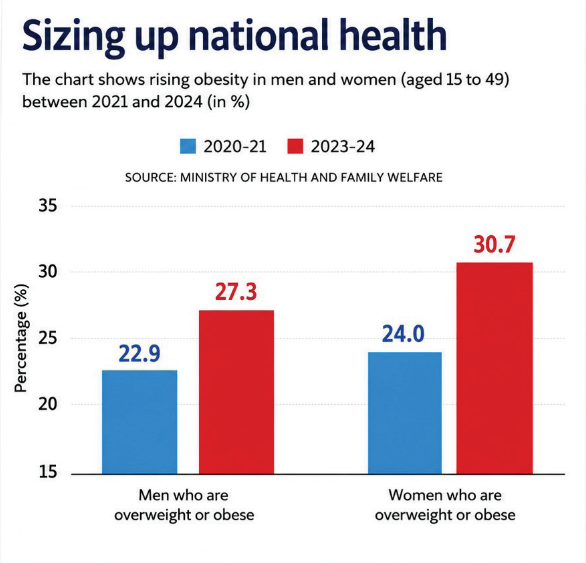
Source: NHFS

India has also made impressive gains in child health. More than **96% of children aged 12–23 months receive at least one vaccine, while full immunisation has increased from 83.8% to 87.1%.** Particularly encouraging is the expansion of Rotavirus vaccination, whose coverage has more than doubled in just a few years. Public health facilities continue to remain the backbone of India's immunisation programme, administering nearly **96% of childhood vaccinations.**

These achievements demonstrate the impact of thousands of ASHA workers, Anganwadi workers, Auxiliary Nurse Midwives and frontline healthcare personnel who bridge the last mile between government programmes and households.

Yet, the health story is far from complete.

As infectious diseases decline, India is witnessing the rapid rise of **non-communicable diseases (NCDs). Around one – third of men and women are having diabetes and hypertension,** prevalent more in urban areas. Obesity is more prevalent in women than men. The country is undergoing an **epidemiological transition** from diseases of poverty to diseases associated with changing lifestyles.



Sizing up national health

The chart shows rising obesity in men and women (aged 15 to 49) between 2021 and 2024 (in %)

SOURCE: MINISTRY OF HEALTH AND FAMILY WELFARE

This means India's healthcare priorities must also evolve. Future success will depend not only on expanding hospitals but also on promoting preventive healthcare, regular health screening, physical activity, healthy diets and early diagnosis.

The Nutrition Paradox: From Hunger to Hidden Hunger

If there is one message that NFHS-6 delivers most powerfully, it is that **India's nutrition challenge has changed, but it has not disappeared.**

Compared to NFHS-5, several child nutrition indicators have improved. **Stunting among children under five has declined from 35.5% to about 32.3%,** indicating better long-term nutritional status. **Wasting has reduced from 19.3% to 16.3%,** severe wasting has declined substantially, and the proportion of underweight children has also fallen. These improvements reflect the combined impact of Poshan Abhiyaan, better maternal healthcare, expanded immunisation and improved child feeding practices.

Despite improvements in nutritional status, **only about 15.3% of children aged 6–23 months receive a minimum acceptable diet,** reflecting many children continuing to receive sufficient calories but not adequate dietary diversity.

At the same time, India is witnessing a steady rise in overweight and obesity among adults, as mentioned earlier. This is the true nutrition paradox.

Women at the Centre of India's Development Story

Over the years, women have moved from being viewed merely as beneficiaries of welfare programmes to becoming active participants in India's development journey. NFHS-6 reflects this transformation across multiple dimensions.

Maternal healthcare has improved substantially, ensuring safer pregnancies and healthier childbirth. More women are registering their pregnancies early, receiving regular antenatal check-ups and delivering in healthcare institutions under the supervision of skilled professionals.

Women's financial empowerment has also witnessed remarkable progress. **Nearly 89% of women now operate their own bank accounts,** enabling them to receive government benefits directly and exercise greater financial independence. This marks a significant shift from earlier decades when financial decisions were often controlled by other family members.

Digital inclusion is emerging as another silent revolution. The proportion of women who have ever used the internet has **almost doubled from 33.3% in NFHS-5 to 64.3% in NFHS-6.** Greater digital access is opening new opportunities for education, entrepreneurship, online services and financial transactions. Combined with expanding mobile phone ownership, digital connectivity is gradually reducing information barriers that have historically limited women's opportunities.

Improved menstrual hygiene practices among adolescent girls and women further reflect growing awareness, better access to sanitary products and sustained public health campaigns. These changes are improving health outcomes while also helping girls remain in school with greater confidence.

Yet, NFHS-6 also reminds us that empowerment remains an unfinished agenda. Women's labour force participation, nutritional status, unpaid care responsibilities and safety continue to require sustained policy attention. True empowerment extends beyond access to services—it requires equal opportunities, dignity, decision-making power and economic independence.

Conclusion:

The survey reminds us that the true measure of a nation's progress is not merely the highways it builds, the industries it creates or the GDP it records. It lies in the health of its mothers, the nutrition of its children, the dignity of its women, the security of its elderly and the opportunities available to every household.

India has travelled a remarkable distance. Smaller families, safer motherhood, improved immunisation, greater financial inclusion and expanding digital access reflect a nation moving steadily forward. Yet, persistent nutritional challenges, rising lifestyle diseases, regional disparities and the unfinished agenda of women's empowerment remind us that development is not a destination but a continuous journey.

As India aspires to become a **Viksit Bharat by 2047,** its greatest investment will not be in concrete or capital alone, but in people. Healthy citizens, educated children, empowered women and resilient families will determine whether the promise of development reaches every corner of the country.

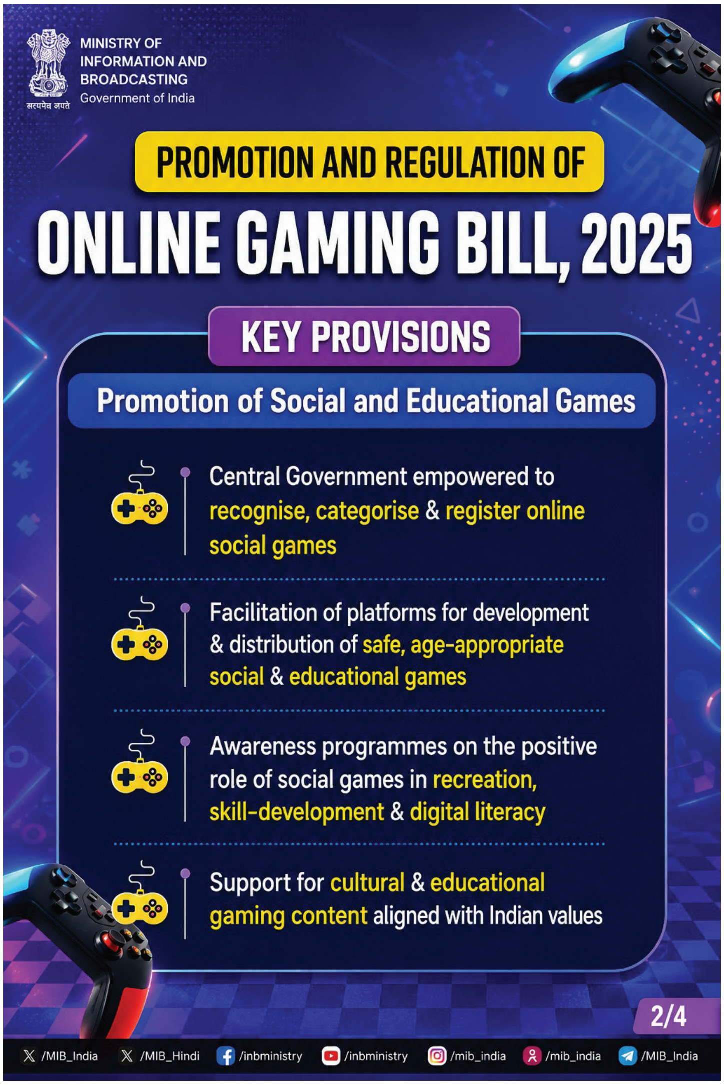
Polity & Governance

DISTINCTION BETWEEN SKILL & CHANCE GAMES
MANDATORY REGISTRATION FOR E-SPORTS
STRICT OVERSIGHT ON REAL MONEY GAMING
COMPLIANCE & KYC REQUIREMENTS
USER PROTECTI
& FRAUD CONT
KNOW THE LAW. STAY COMPLIANT. AVOID LEGAL RISKS.

Online Gaming Regulation in India: Limits of Prohibition

Context:

The **Promotion and Regulation of Online Gaming (PROG) Act, 2025** was enacted to protect users from the social, financial, and psychological harms of online betting and gambling. However, reports after the ban indicate increasing migration toward offshore betting platforms, raising concerns about whether prohibition without regulation is proving counterproductive.



MINISTRY OF INFORMATION AND BROADCASTING
Government of India

PROMOTION AND REGULATION OF

ONLINE GAMING BILL, 2025

KEY PROVISIONS

Promotion of Social and Educational Games

- Central Government empowered to recognise, categorise & register online social games
- Facilitation of platforms for development & distribution of safe, age-appropriate social & educational games
- Awareness programmes on the positive role of social games in recreation, skill-development & digital literacy
- Support for cultural & educational gaming content aligned with Indian values

2/4

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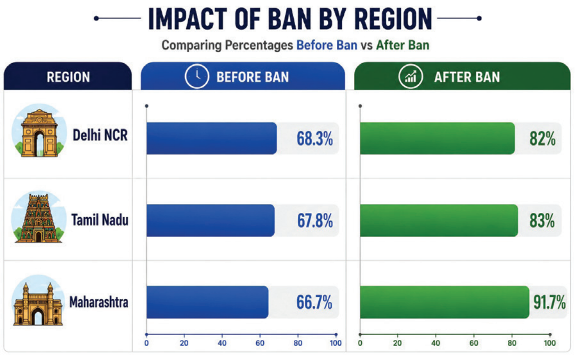
Why did the blanket bans turn counterproductive?

Structural factors

- **Blanket bans shift users toward illegal ecosystems:** Blanket bans displaced users from regulated domestic platforms to offshore ecosystems beyond Indian regulatory oversight.
  - CUTS International study showed increased offshore participation after the ban:


IMPACT OF BAN BY REGION

Comparing Percentages Before Ban vs After Ban

  - **Offshore platforms weaken consumer protection:**
  - Users shifting offshore face,
    - absence of grievance redressal,
    - weak legal remedies,
    - increased exposure to fraud and manipulation
  - Domestic authorities struggle to protect consumers once platforms operate outside jurisdictional reach.
- **Technological evasion limits enforcement:** Illegal operators use VPNs, proxy servers, mirror websites, encrypted platforms like Telegram and WhatsApp.
  - By the time authorities block one domain, users often shift to another platform.
  - This creates a continuous enforcement gap.
- **Offshore platforms may aid financial crime:** Offshore betting ecosystems may facilitate financial fraud, cybercrime, money laundering, and illegal betting networks.
  - A fraud racket in Tamil Nadu used Telegram-based **"Old Coin Purchase Task"** schemes to lure victims into fake investment scams promising high returns.
  - Fraudsters also used **"mule accounts"** opened in villagers' names to divert illegal money.

Operational factors

- **Reactive enforcement remains inadequate:** The Ministry of Electronics and IT informed Parliament that **8,376 URLs had been blocked** to tackle illegal offshore betting activity. However, illegal networks continue to adapt rapidly.
- **Regulatory fragmentation:** Authorities face limitations in:
  - Consumer protection
  - Grievance redressal
  - Financial monitoring
  - Cybercrime enforcement
  - Cross-border regulatory coordination
- **Limitations in digital governance:** Technology evolves faster than regulation, bans are difficult to enforce in borderless digital ecosystems.

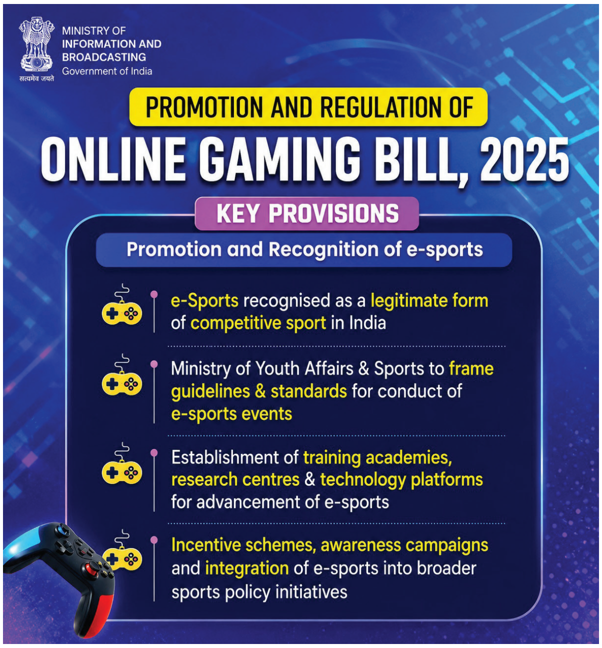
How are other countries regulating online gaming?

United Arab Emirates (UAE)

- Introduced a tightly regulated federal licensing framework in 2023.
- Adopted:
  - Strict compliance requirements
  - Deposit limits
  - Harm-prevention safeguards

Sri Lanka

- Moving towards a **centralised Gambling Regulatory Authority.**
- Seeking to bring offshore online gaming activity within formal regulatory oversight.


MINISTRY OF INFORMATION AND BROADCASTING
Government of India

PROMOTION AND REGULATION OF

ONLINE GAMING BILL, 2025

KEY PROVISIONS

Promotion and Recognition of e-sports

- e-Sports recognised as a legitimate form of competitive sport in India
- Ministry of Youth Affairs & Sports to frame guidelines & standards for conduct of e-sports events
- Establishment of training academies, research centres & technology platforms for advancement of e-sports
- Incentive schemes, awareness campaigns and integration of e-sports into broader sports policy initiatives

How can India regulate online gaming more effectively?

Incremental measures

- Strengthen monitoring of offshore betting platforms
- Improve **Centre–State coordination**
- Expand cybercrime enforcement capacity
- Strengthen **consumer-protection and grievance-redress mechanisms**
- Increase **public-awareness campaigns** on online betting risks

Disruptive measures

- Move from blanket prohibitions towards a **regulated domestic framework**
- Develop **licensing-based oversight mechanisms**
- Bring offshore online gaming activity within formal regulatory supervision
- Strengthen **accountability, financial monitoring, and consumer safeguards** through regulated ecosystems
- **Reinvest regulatory revenues into enforcement systems** and addiction-awareness programmes

Conclusion:

Online gaming risks cannot be addressed through bans alone. Effective governance requires accountable regulation, technological enforcement, consumer safeguards, and coordinated oversight that protects users without driving activity into unregulated digital spaces.

Special Intensive Revision (SIR) of electoral rolls

Context:

The Supreme Court has upheld that the Election Commission's Special Intensive Revision (SIR) of electoral rolls falls within the constitutional responsibility of the Election Commission (EC) under Article 324.

What is an Electoral Roll?

- An electoral roll is the official list of eligible voters prepared by the Election Commission.
- Free and fair elections depend not only on polling, but also on accuracy, integrity, and purity of electoral rolls.
- The Court described electoral rolls as the foundation of the democratic process.

What is the constitutional basis of the Election Commission's powers?

- **Article 324** vests the Election Commission with superintendence, direction, and control of elections.
- The Court interpreted Article 324 broadly and held that EC's supervisory powers extend across all stages of the electoral process, including preparation and revision of electoral rolls.

Why is citizenship linked to electoral rolls?

- The Court held citizenship is a condition precedent for enrolment in electoral rolls.
- Therefore, while preparing or revising rolls, the EC can examine questions related to citizenship for inclusion or exclusion purposes.
- However final adjudication of citizenship disputes must occur under the Citizenship Act by competent authorities.

What is Special Intensive Revision?

A large-scale revision of electoral rolls conducted by the Election Commission to:

- verify voter eligibility,
- remove duplicate or ineligible entries,
- include eligible voters left out of rolls,
- update rolls to reflect changes in residence, migration, death, citizenship status.

Unlike routine revisions, SIR involves:

- extensive field verification,
- scrutiny of voter records,
- booth-level verification exercises.

What are the concerns around SIR?

Structural factors

- **Risk of wrongful exclusion:** Large-scale verification may wrongly delete genuine voters, especially due to migration, duplication, and documentation gaps.

- **Citizenship verification concerns**: SIR could become indirect citizenship screening.
  - The Court rejected this argument but recognised that citizenship verification remains linked to voter eligibility.

Cyclical factors

- **Large-scale migration and urbanisation:** Population mobility creates duplicate entries, outdated rolls, and residence-based verification challenges.
- **Delayed intensive revisions:** More than twenty years had passed since the last intensive revision, increasing concerns about electoral inaccuracies.
- **Continuing litigation and political contestation:** The SIR process proceeded even while constitutional challenges were pending before the Supreme Court.

Conclusion:

The SIR judgment strengthens the Election Commission's constitutional authority over electoral integrity, but also highlights the need for strong procedural safeguards to ensure that efforts to maintain accurate rolls do not undermine democratic inclusion.

Indian Sedition Law

Context:

The Supreme Court has clarified that trials, appeals, and proceedings under **Section 124A (sedition)** may continue if the accused persons consent to face trial though the constitutional challenges to sedition are pending before the court.

What is Sedition under Indian Law?

- Sedition refers to acts or speech that allegedly incite **hatred, contempt or disaffection** against the government established by law.
- Originally Section 124A existed under the **Indian Penal Code (IPC).**
- Punishment could extend to life imprisonment.
- The provision traces its origins to colonial British law to suppress political dissent.
  - The offence emerged from the English Sedition Act tradition linked to protecting state authority or the Crown.
- **Criticism on it:** The sedition law may,
  - create chilling effect on free speech,
  - suppress dissent,
  - enable misuse.

How did the court interpret sedition?

- In ***Kedar Nath Singh v. State of Bihar (1962),*** the Supreme Court upheld sedition law but limited its scope.
  - The Court held criticism of the government is protected, unless it incites violence, public disorder.
  - Thus, mere criticism or dissent is not sedition.
- In **Supreme Court interim order (2022),** the Court kept sedition proceedings in abeyance, and asked governments not to register fresh FIRs under Section 124A, while constitutional validity was under examination.
  - This happened during challenges to:
    - Section 124A IPC,
    - later Section 152 of Bharatiya Nyaya Sanhita (BNS), considered its successor.
- The recent clarification allows trials, appeals, and proceedings under Section 124A to continue if the accused person gives consent.
- This partially revives sedition proceedings despite the constitutional challenge remaining undecided.

What constitutional aspects are related to this?

- **Article 19(1)(a): Freedom of Speech and Expression**
  - The debate centres on whether sedition-type restrictions disproportionately affect democratic dissent.
- **Article 21: Right to Life and Personal Liberty**
  - Prolonged criminal proceedings under uncertain legal provisions may affect personal liberty and due process protections.

What constitutional concerns arose from the recent clarification?

Structural factors

- **Unequal application of law**
  - Proceedings continue only for accused persons who consent.
  - This creates disparity between similarly placed accused persons.
- **Constitutional uncertainty:** Lower courts may continue trials under a law whose constitutional validity remains undecided.
- **Burden shifted onto accused persons:** Citizens are forced to choose between:
  - prolonged legal limbo,
  - or facing trial under a disputed provision.

Cyclical factors

- The prolonged pendency of challenges has created legal uncertainty.
- Section 152 BNS, viewed as successor to sedition, is also under challenge.

How can constitutional balance be restored?

Incremental measures

- Expedite constitutional adjudication on sedition provisions.
- Ensure stricter judicial scrutiny before registration of sedition-type cases.
- Limit prosecution to cases involving incitement, violence, and public disorder.

Disruptive measures

- Reconsider the continued necessity of sedition-type offences in a constitutional democracy.
- Align free speech jurisprudence with post-Kedar Nath constitutional standards.
- Reassess Section 152 BNS in light of fundamental rights protections.

Conclusion:

The sedition debate reflects the continuing tension between state authority and constitutional liberty. Resolving this uncertainty requires clear constitutional adjudication that protects democratic dissent while permitting narrowly tailored restrictions against genuine threats to public order.

Suo Motu Cognisance by the Supreme Court

Context:

Recent suo motu proceedings initiated by the Supreme Court in the Twisha Sharma case have revived debates on the expanding use of suo motu jurisdiction, judicial prioritisation, and whether excessive attention to high-visibility cases is diverting focus from systemic judicial reform.

Suo Motu Cognisance

1 WHAT IS SUO MOTU?

- "Suo motu" means **"on its own motion"**.
- It refers to a **court taking up a matter on its own without a formal petition** being filed by affected parties.

2 MATTERS INVOLVING SUO MOTU POWER

Courts invoke this power in matters involving:

- public importance,
- constitutional concerns,
- administrative failure,
- violation of human rights.
- environmental concerns,
- custodial violence,
- or institutional lapses.

3 SOURCE OF POWER – SUPREME COURT

The **Supreme Court** derives such powers broadly from:

- ✓ constitutional authority (Article 32, Article 136, Article 142),
- ✓ judicial review,
- ✓ and its role as protector of Fundamental Rights.

4 POWER OF HIGH COURTS

High Courts also exercise similar powers **(Article 226)**.

5 NATURE OF SUO MOTU COGNISANCE

Originally, *suo motu* cognisance functioned as a **rare, exceptional, and residual constitutional jurisdiction.**

Suo motu power is a powerful judicial tool to ensure justice, protect rights, and uphold the Constitution.

What concerns are emerging around expanding suo motu intervention?

Structural factors

- **Judicial attention shifting toward high-visibility cases:** Televised listings and media-triggered interventions are becoming frequent and are influencing judicial cognisance.
  - Media narratives can shape judicial urgency before complete factual determination.
- **Scarcity of judicial attention:** Judicial attention is treated as a **limited constitutional resource**.
  - Repeated concentration on sensational matters can reduce institutional focus on:
    - ordinary criminal justice,
    - pendency reduction,
    - trial efficiency,
    - and subordinate court functioning.
- **Weak focus on systemic judicial reform:** Deeper structural issues receive less attention, including:
  - trial court infrastructure,
  - judicial appointments,
  - case management,
  - lower judiciary strengthening.
- **Over-centralisation in the apex court:** Cases shift upward toward the Supreme Court.
  - This weakens reliance on ordinary judicial

processes, high court supervision, and trial court functioning.

- **Weakening focus on subordinate judiciary:** Everyday justice delivery primarily depends on trial courts, magistrates, subordinate judiciary, rather than episodic apex-level intervention.
  - High-visibility constitutional intervention can **overshadow routine judicial administration**, case disposal, evidence recording, and trial management.
- **Weak utilisation of High Court supervisory role:** Article 235 grants High Courts control over subordinate courts, including postings, promotions, disciplinary control, and administrative supervision.
- **Weak utilisation of Article 235 framework:** Article 235 grants High Courts control over subordinate courts, including postings, promotions, disciplinary control, and administrative supervision.

Sahara India Real Estate Corporation v. SEBI (2012)

- In this case, the Supreme Court evolved the **"postponement order"** principle.
- **Key aspect:** Courts may temporarily restrain media reporting in order to protect fair trial rights where substantial risk of prejudice exists.
- The judgment recognised:
  - tension between free press and fair trial, and the constitutional obligation to preserve impartial administration of justice.

Cyclical factors

- **Rising frequency of suo motu cases:**
  - 35 suo motu matters between 2020–2024.
  - In 2025 (till May 25), 5 civil and 4 criminal suo motu matters had already been initiated.
- **Growing use in criminal matters:** Suo motu criminal interventions and contempt proceedings have increased sharply.
- **Delays in ordinary justice delivery:** Rapid apex-court intervention contrasts slow functioning of trial courts and ordinary criminal justice processes.
  - National Crime Records Bureau (NCRB) data cited 6,450 murder deaths recorded in 2022 resulted in convictions in only 11–17% of cases.

Judicial activism Vs. Institutional Capacity

What courts are increasingly doing	What the system actually needs more
Suo motu cases	trial court strengthening
Court-monitored probes	Infrastructure reforms
Transfer of investigations	Case management systems
Continuing supervision	Judicial administration reform, training
Constitutional visibility	High Court supervision under Article 235.

How can judicial effectiveness be strengthened?

Incremental measures

- Restrict suo motu use to genuinely exceptional situations.
- Avoid media-triggered constitutional overreach.
- Prioritise institutional remedies before direct intervention.
- Strengthen High Court supervision mechanisms.
- Improve coordination with subordinate judiciary.
- Focus judicial attention on systemic reforms alongside constitutional intervention.

Disruptive measures

- Shift judicial focus from episodic intervention toward systemic reform.
- Rebalance judicial attention between constitutional spectacle and ordinary justice delivery.
- Strengthen Article 235-based High Court supervision over subordinate courts.
- Move from **"constitutional spectacle"** towards "institutional judicial capacity".
- Reduce excessive centralisation of judicial supervision in the apex court.

Conclusion:

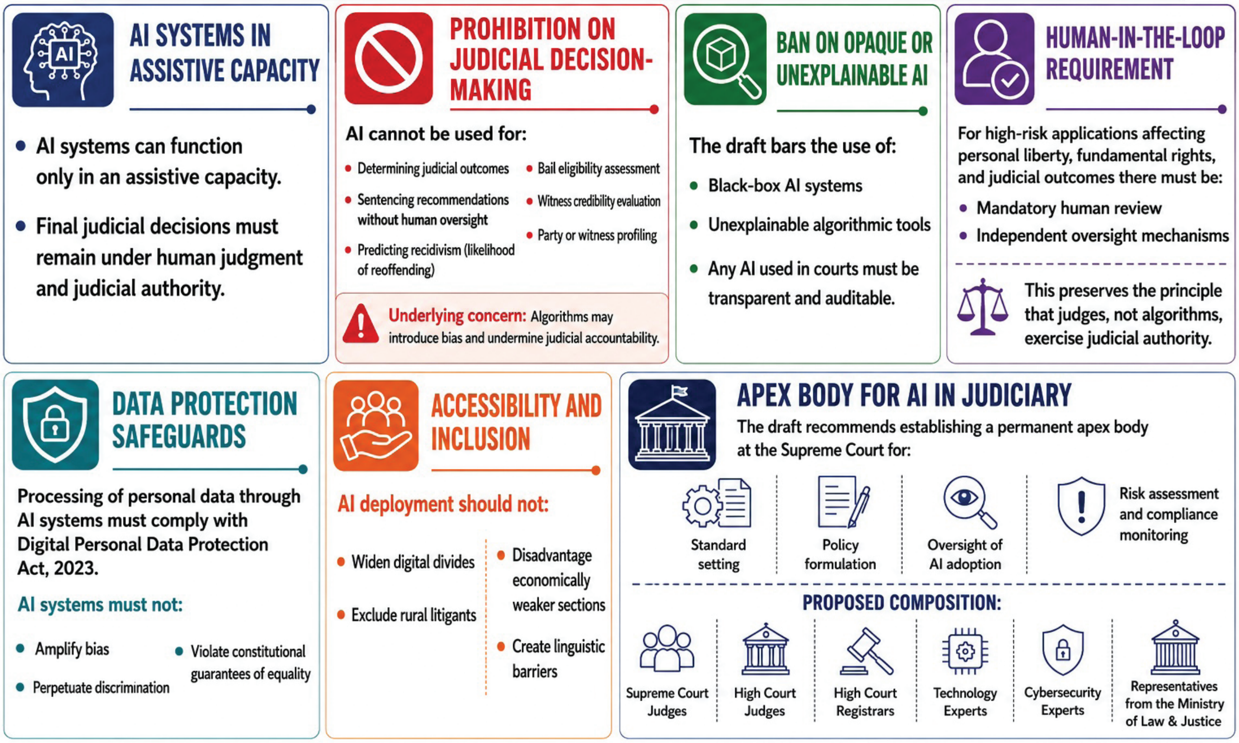
Suo motu jurisdiction remains an important constitutional tool for protecting rights and addressing institutional failures. However, durable judicial reform ultimately depends not only on high-visibility intervention by apex courts, but also on strengthening trial courts, judicial administration, and the everyday institutional capacity of the justice system.

AI in Courts: Draft Supreme Court Regulations, 2026

Context:

The Supreme Court's AI Committee has released a draft "**Regulations for Use of Artificial Intelligence (AI) in Courts, 2026**", proposing safeguards for the use of AI in judicial processes.

Key provisions of the draft regulations



AI SYSTEMS IN ASSISTIVE CAPACITY

- AI systems can function only in an assistive capacity.
- Final judicial decisions must remain under human judgment and judicial authority.

PROHIBITION ON JUDICIAL DECISION-MAKING

AI cannot be used for:

- Determining judicial outcomes
- Sentencing recommendations without human oversight
- Predicting recidivism (likelihood of reoffending)
- Bail eligibility assessment
- Witness credibility evaluation
- Party or witness profiling

Underlying concern: Algorithms may introduce bias and undermine judicial accountability.

BAN ON OPAQUE OR UNEXPLAINABLE AI

The draft bars the use of:

- Black-box AI systems
- Unexplainable algorithmic tools
- Any AI used in courts must be transparent and auditable.

HUMAN-IN-THE-LOOP REQUIREMENT

For high-risk applications affecting personal liberty, fundamental rights, and judicial outcomes there must be:

- Mandatory human review
- Independent oversight mechanisms

This preserves the principle that judges, not algorithms, exercise judicial authority.

DATA PROTECTION SAFEGUARDS

Processing of personal data through AI systems must comply with Digital Personal Data Protection Act, 2023.

AI systems must not:

- Amplify bias
- Perpetuate discrimination
- Violate constitutional guarantees of equality

ACCESSIBILITY AND INCLUSION

AI deployment should not:

- Widen digital divides
- Exclude rural litigants
- Disadvantage economically weaker sections
- Create linguistic barriers

APEX BODY FOR AI IN JUDICIARY

The draft recommends establishing a permanent apex body at the Supreme Court for:

- Standard setting
- Policy formulation
- Oversight of AI adoption
- Risk assessment and compliance monitoring

PROPOSED COMPOSITION:

- Supreme Court Judges
- High Court Judges
- High Court Registrars
- Technology Experts
- Cybersecurity Experts
- Representatives from the Ministry of Law & Justice

Significance of these regulations:

- **Judicial Accountability:** Ensures responsibility remains with judges rather than algorithms.
- **Protection of Fundamental Rights:** Prevents automated decisions affecting liberty and justice.
- **Ethical AI Adoption:** Balances technological innovation with constitutional safeguards.
- **Public Trust in Judiciary:** Maintains transparency and legitimacy of judicial processes.

Glossary

- **Explainable AI (XAI):** AI systems whose reasoning and outputs can be understood and audited by humans.
- **Human-in-the-Loop (HITL):** A governance model where human oversight remains mandatory in AI-assisted decision-making.
- **Black-Box AI:** AI systems whose internal decision-making process cannot be easily interpreted or explained.

Conclusion:

The draft regulations seek to balance technological innovation with constitutional safeguards by ensuring that AI remains a judicial aid rather than a judicial decision-maker, preserving human accountability at the heart of justice delivery.

Decentralised Planning in Rural Development

Context:

The Ministry of Rural Development plans to train around **2,000 Block Development Officers (BDOs)** in decentralised planning.

What is decentralised planning?

- Process where local bodies participate in identifying needs, setting priorities and preparing development plans suited to local conditions.
- **Significance:**
  - o Promotes participatory governance.

  - Improves local accountability.
  - Enables better resource allocation.
  - Integrates local infrastructure and livelihood needs.
  - Strengthens Panchayati Raj Institutions (PRIs).

Key highlights of the initiative:

- Capacity building of **Block Development Officers (BDOs)**.
- Training in:
  - **Geographic Information Systems (GIS)**
    - Spatial mapping of local resources.
    - Infrastructure planning.
    - Evidence-based development planning.
  - **Management Information Systems (MIS)**
    - Monitoring programme implementation.
    - Data collection and performance tracking.
    - Improving transparency and accountability.
- Supports implementation of:
  - **Ajeevika Mission (DAY-NRLM)**
  - Rural employment and infrastructure programmes.
- Aims to strengthen **last-mile service delivery**.

Conclusion:

Effective decentralisation requires not only devolution of functions but also local planning capacity. The BDO training initiative will strengthen the administrative backbone needed for Gram Panchayat-led development planning.

Tuberculosis Elimination in India

Context:

Despite being preventable and treatable, Tuberculosis (TB) remains the world's deadliest infectious disease, causing more annual deaths than COVID-19 at its peak. New evidence from the ICMR-supported **PreVenTB trial** highlights the potential of targeted vaccination strategies, preventive therapy, and nutritional support in accelerating India's TB elimination efforts rather than reliance on a single vaccine solution.

Key details about TB

- An infectious disease caused by ***Mycobacterium** tuberculosis*.
- **Disease Spectrum of TB:** After exposure, individuals may follow different pathways:
  - **Latent TB Infection (LTBI):** Infection without symptoms.
  - **Subclinical TB:** Minimal or no symptoms, but infection persists.
  - **Active Pulmonary TB (PTB):** Affects lungs and drives transmission.
  - **Extrapulmonary TB (EPTB):** Affects organs outside the lungs; harder to diagnose and often associated with higher morbidity.

Why does India need a multi-layered TB elimination strategy?

- **Scale of burden**
  - India carries one of the world's largest TB burdens.
  - TB incidence in many LMICs remains between **200–300 cases per 100,000 population**.
  - Elimination requires reducing incidence to **10–20 per 100,000 population**.
- **No one-size-fits-all vaccine**
  - Most previous vaccine trials focused primarily on pulmonary TB.
  - Disease heterogeneity makes a single universal vaccine solution difficult.
- **TB elimination requires multiple interventions**
  - Early detection.
  - Preventive therapy.
  - Targeted vaccination.
  - Nutritional support.
  - Sustained public-health investment.

Why does TB persist despite existing interventions?

Structural factors

- **Weak detection of latent and subclinical TB:** Many infected individuals remain undiagnosed until disease becomes active.
- **Nutritional vulnerability:** Lower vaccine effectiveness was observed among individuals with low Body Mass Index (BMI), highlighting the role of malnutrition.
- **Uneven access to diagnostics and preventive therapy:** Coverage remains inconsistent across regions and vulnerable populations.
- **Socio-economic determinants:** TB disproportionately affects poorer populations and remains linked to living conditions and nutritional deprivation.

Programmatic factors

- **Over-reliance on breakthrough solutions:** Waiting for a perfect vaccine delays deployment of available interventions.
- **Limited focus on extrapulmonary TB:** EPTB remains underdiagnosed despite its significant disease burden.
- **Fragmented intervention approach:** Vaccination, nutrition, diagnostics, and preventive therapy often operate in silos.

EXISTING INITIATIVES OF INDIA

NATIONAL TB ELIMINATION PROGRAMME (NTEP):

India's flagship programme for TB prevention, diagnosis, treatment, and surveillance.

INDIGENOUS VACCINE INNOVATION

① VPM1002 | ② Immuvac

ADVANCED DIAGNOSTICS

① Truenat
- First indigenous molecular TB diagnostic platform.
- Adopted by NTEP before WHO pre-qualification.

What should India do?

Incremental measures

- **Strengthen targeted vaccination**
  - Prioritise household contacts of TB patients.
  - Focus on school-age children and adolescents.
  - Use evidence-based deployment of VPM1002 and Immuvac.
- **Improve early detection**
  - Expand screening for latent and subclinical TB.
  - Integrate advanced molecular diagnostics.
- **Integrate preventive therapy:** Ensure timely treatment of latent infections before progression.
- **Strengthen nutritional support:** Align vaccination and treatment programmes with nutritional interventions, especially for undernourished populations.

Disruptive measures

- **Move from disease treatment to risk-based prevention:** Create a life-cycle TB prevention framework covering household contacts, high-risk populations, children and adolescents, and individuals with comorbidities.
- **Develop differentiated vaccination strategies:** Instead of seeking one universal vaccine, adopt multiple vaccines for:
  - Different age groups.
  - Different disease manifestations (PTB and EPTB).
  - Different risk categories.
- **Build an integrated TB-control ecosystem:** Combine diagnostics, vaccination, preventive therapy, nutritional support, and case-based clinical management into a unified public-health strategy.

Conclusion:

India's TB challenge cannot be solved through a single vaccine breakthrough. A realistic pathway to elimination lies in combining targeted vaccination, early detection, preventive therapy, nutritional support, and sustained public-health investment. The lesson from recent evidence is clear: deploying effective tools today is more valuable than waiting indefinitely for a perfect solution tomorrow.

Doctrine of Forum Non Conveniens

DOCTRINE OF
FORUM NON CONVENIENS

Context:

In **Baksish Ahmad v. Union of India (2026)**, the Supreme Court has upheld the application of the doctrine of **forum non conveniens**.

What is Doctrine of Forum Non Conveniens?

- **Forum non conveniens** = "An inconvenient forum"
- A judicial doctrine under which **a court may decline to hear a case** despite having jurisdiction if another court is substantially more appropriate to hear the dispute.
  - **Example:** A person lives in Jammu & Kashmir and a dispute arose in Jammu & Kashmir. Witnesses, records and authorities are in Jammu & Kashmir. Only one minor communication was issued from Delhi.
  - Technically, Delhi High Court may get jurisdiction because a small part of the cause of action arose in Delhi.
  - But Delhi High Court may say "J&K High Court is the more appropriate forum. We will not entertain the case."
  - This is the doctrine of forum non conveniens.
- **Purpose:**
  - Prevent forum shopping.
  - Ensure convenience of parties.
  - Promote efficient administration of justice.

What did the Supreme Court Say?

The court said that even if a High Court technically has jurisdiction under **Article 226** because part of the cause of action arose within its territory, it may still refuse to entertain the **writ petition** if another High Court is clearly the more appropriate forum.

How is it linked to Article 226?

- **Article 226(1):** A High Court can issue writs within its territorial jurisdiction.
- **Article 226(2):** A High Court can also exercise jurisdiction if the cause of action wholly or partly arises within its territory, even when the authority is located elsewhere.

Then why is forum non conveniens needed?

Courts use forum non conveniens to:

- **Prevent forum shopping:** Sometimes,
  - Multiple High Courts may have jurisdiction.
  - Petitioners may choose a forum that is technically available but not the most appropriate. This can lead to **forum shopping.**
- **Promote efficient administration of justice:** Cases are heard where,
  - records are available,
  - authorities are situated,
  - witnesses are present.
- **Reduce burden on courts:** Avoids unnecessary litigation in distant High Courts.

Conclusion:

The judgment strengthens access to constitutional remedies by clarifying that discretionary doctrines such as forum non conveniens cannot ordinarily dilute the territorial writ jurisdiction expressly granted to High Courts under Article 226(1), while still leaving room to address forum-shopping concerns in appropriate Article 226(2) cases.

Right of Walk a Fundamental Right

Context:

In **Iliyaz @ Shaik Riyaz v. P. Ayyappan (2026)**, the Supreme Court held that the right to walk on **demarcated, safe and well-maintained footpaths** is a **fundamental right** and called for a statutory framework and dedicated regulator to protect pedestrian rights.

What is the constitutional basis for the Right to Walk?

- **Article 14:** Equal access to public spaces and public infrastructure is integral to substantive equality.
- **Article 19(1)(d):** Guarantees freedom of movement throughout the territory of India.
- **Article 19(1)(a), 19(1)(b) & 19(1)(c):** Walking enables freedom of expression, peaceful assembly, and formation of associations.
- **Article 21:** Safe mobility is linked to Right to life, Dignity, and Personal safety.
- **Article 39(b):** Material resources of the community must be distributed to subserve the common good.
- **Public Trust Doctrine:** Roads and footpaths are public resources held by the State in trust for citizens and cannot be monopolised by competing interests
- **Judicial Position:** If a road exists, there must be a corresponding duty on the State to provide and maintain a safe footpath.

Why are footpaths more than just safe spaces?

- **Walking as a constitutional freedom:** Walking is not merely movement. It enables expression, congregation and association.
- **Walking as a social equaliser:** Most accessible mode of transport. Particularly important for:
  - Poor households,
  - Children,
  - Elderly persons,
  - Persons without private vehicles.
- **Walking as access to public space:** Provides access to common spaces and public life. Enhances inclusiveness of cities.
- **Walking as democratic participation:** Historically associated with Public mobilisation, Labour movements, Freedom struggle, and Peaceful protest.

How did the court reinterpret footpaths?

- The Court viewed,
  - Footpaths as **public resources** held in trust for citizens.
  - Footpaths should not be monopolised by competing interests.
  - Public authorities must ensure equitable access.
  - Pedestrian access is part of the constitutional idea of common spaces.
- The Court emphasised that rights become meaningful only when backed by institutions citing **Right to Education Act (RTE), 2009** which,
  - Operationalised Article 21A.
  - Established enforcement architecture.
  - Recognised the National Commission for Protection of Child Rights (NCPCR) as regulator.
- The Court suggested a similar model for pedestrian rights:
  - A statutory framework for pedestrian rights.
  - Identification of duty-bearers.
  - Enforcement mechanisms.
  - Grievance-redress systems.
  - A dedicated regulator.

Why have pedestrian rights weakened?

Structural issues

- **Vehicle-centric planning:** Urban development prioritised motor vehicles over pedestrians. Footpaths treated as residual spaces.
- **Inadequate pedestrian infrastructure:**
  - Many cities lack continuous, obstruction-free footpaths.
  - Public investment remains skewed towards roads and vehicular mobility.
- **Fragmented governance framework:**
  - Pedestrian safety is governed through,
    - Municipal laws,
    - Town planning statutes,
    - Street-design regulations.
  - No comprehensive national framework exists.
  - Pedestrian infrastructure lacks dedicated planning, enforcement and monitoring mechanisms.
  - **Regulatory vacuum:** No dedicated legislation governing pedestrian rights. Existing laws focus largely on vehicular movement.
- **Weak implementation of the Street Vendors Act, 2014:**
  - The Act sought to protect vendors' livelihood rights under Article 19(1)(g) through:
    - Vendor surveys,
    - Town Vending Committees,
    - Demarcated vending zones.
  - However, implementation has lagged in many cities.
  - Delayed surveys and non-demarcation of vending zones have contributed to:
    - Encroachments on footpaths,
    - Informal rent-seeking,
    - Conflicts between pedestrian mobility and street vending.

Governance issues

- **Failure of duty-bearers:** Primary responsibility rests with:
  - Urban Development Authorities,
  - Municipal Corporations,
  - Municipalities,
  - Panchayats.

- **Common-good principle not reflected in planning:** Public authorities often prioritise motor vehicles over pedestrian access despite constitutional obligations under Article 39(b).
- **Lack of accountability:** No specialised institution exists to ensure continuous protection of pedestrian rights.

Social and behavioural issues

- **Walking Treated as a Nuisance:** Motorised transport dominates public spaces. Pedestrians are often treated as secondary road users.
- **Encroachments and fragmentation:** Footpaths occupied by Parking, Utilities, Construction debris, and Other competing uses.
- **Weak Civic and Institutional Support:** Citizens are expected to comply with civic obligations while walking has gradually lost priority in urban design and governance.

How can pedestrian rights be protected?

Incremental measures

- Enact a statutory framework recognising pedestrian rights.
- Clearly identify duty-bearers responsible for footpaths.
- Provide quick remedies for violations.
- Integrate pedestrian safety into urban planning.

Disruptive measures

- Establish a full-time pedestrian regulator.
- Create specialised institutional expertise for planning and enforcement.
- Institutionalise pedestrian rights through a dedicated regulatory architecture similar to the RTE framework.
- Shift transport governance from vehicle-centric to pedestrian-inclusive design.
- Treat pedestrian infrastructure as a constitutional obligation rather than a municipal amenity.

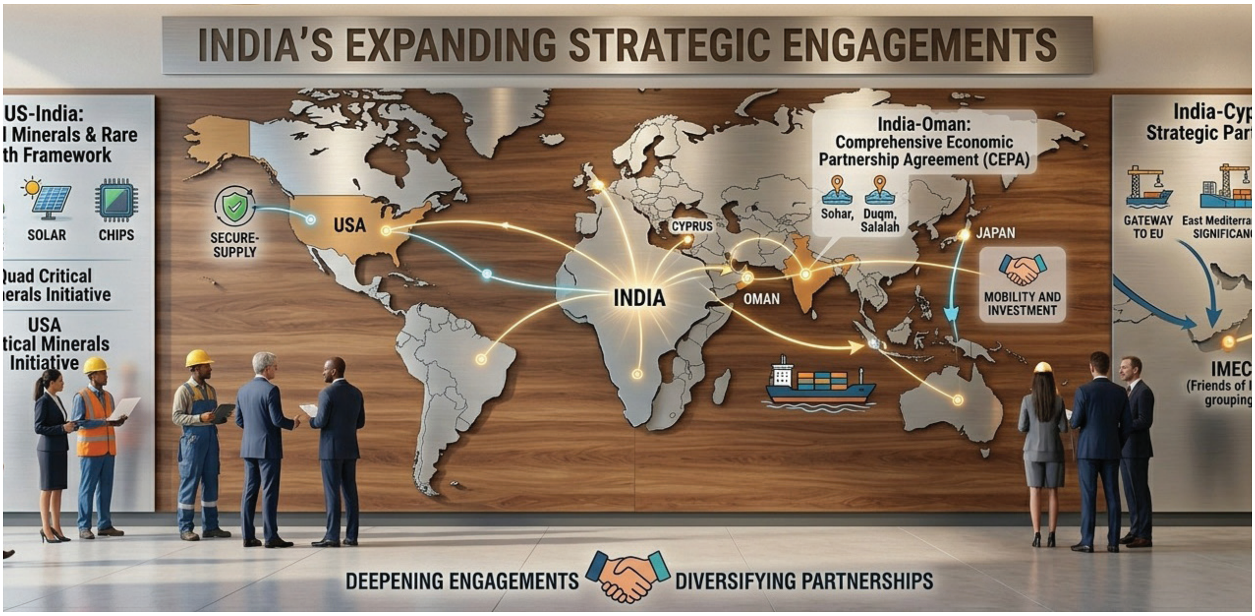
Conclusion:

The right to walk transforms footpaths from civic amenities into constitutional infrastructure, requiring governments to guarantee safe, inclusive and accessible public spaces through law, institutions and accountable urban planning.

Give it a try

The right to walk is increasingly emerging as a constitutional question of urban equality rather than merely a matter of road safety." Examine. **(10 Marks, 150 Words)**

International Relations


INDIA'S EXPANDING STRATEGIC ENGAGEMENTS
US-India:
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grouping
DEEPENING ENGAGEMENTS
DIVERSIFYING PARTNERSHIPS

India - Cyprus Strategic Partnership

Context:

India and Cyprus elevated their bilateral ties to a **Strategic Partnership** during the visit of Cypriot President Nikos Christodoulides to India.

Why is Cyprus strategically important for India?

Gateway to the European Union (EU)

- Cyprus currently holds the Presidency of the Council of the European Union.
- India views Cyprus as:
  - An **"investment gateway"** to Europe.
  - An entry point for broader India–EU engagement.

Eastern Mediterranean significance

- India is expanding strategic engagement in the eastern Mediterranean region.
- Cyprus occupies an important position in:
  - Maritime connectivity
  - Regional logistics
  - Europe–West Asia trade routes

Connectivity and IMEC

- Cyprus expressed support for **India–Middle East–Europe Economic Corridor (IMEC)**
- Cyprus has:
  - Formed a **"Friends of IMEC"** grouping within the EU.
  - Started work related to IMEC-linked connectivity and supply-chain facilitation.
- The two sides also discussed transit facilitation for global cargo traffic affected by disruptions linked to the West Asian conflict.

Conclusion:

Arctic Ocean
© WorldAtlas.com
Arctic Circle
66°30'N
Asia
Europe
Black Sea
Caspian Sea
Aral Sea
Med. Sea
Cyprus
N
Tropic of Cancer
23°5'N
Red Sea
Arabian Sea
Bay of Bengal
Pacific Ocean
0°
Africa
Gulf of Aden
Equator
Oceania
Indian Ocean
23°5'S
Tropic of Capricorn
1500 mi
1500 km
Australia

The India–Cyprus Strategic Partnership reflects India's expanding strategic footprint in the eastern Mediterranean and its deepening engagement with

Europe through connectivity, defence cooperation, and maritime partnerships. As geopolitical and supply-chain realignments reshape the wider region, such partnerships are likely to become important pillars of India's evolving multi-alignment and connectivity strategy.

India - US Critical Minerals & Rare Earth Framework

Context:

On the sidelines of the **11th Quad Foreign Ministers' Meeting (FMM)**, India and the United States finalised a framework for cooperation on critical minerals and rare earth elements. This deal is a continuation of the India - US bilateral engagements on securing supply routes for critical minerals, including India becoming a signatory to the **U.S.-led Pax Silica initiative** on February 20, 2026.

What are critical minerals?

- Minerals that are essential for **national economic security** and **clean-energy technologies**, but whose **supply is at risk** because of **limited domestic production** or **concentrated global supply chains**.
- The Ministry of Mines released a list of **30 critical minerals** for India (July 2023).
    - Two subgroups, **Rare Earth Elements (REEs)** like neodymium, dysprosium, etc., and **Platinum Group Elements (PGEs),** are part of the list, in addition to lithium, cobalt, Nickel, etc.
- **Applications**:
    - **Clean energy**: Electric Vehicle (EV) batteries, solar panels, wind turbines.
    - **Electronics**: Smartphones, laptops, semiconductors.
    - **Defence & aerospace**: Missiles, satellites, fighter jets.
    - **Industrial use**: Catalysts, magnets, alloys.

What are Rare Earth Elements (REEs)?

- A group of **17 metallic elements** that are essential for advanced technologies and strategic industries.
- These are part of **critical minerals**.

Why are India - US cooperating in this deal?

Structural factors

- China imposed export controls on rare earth elements and strategic metals in 2025.
- Concerns increased over shortages of critical metals in global markets.
- Technology supply chains increasingly depend on secure access to critical minerals.

Geopolitical factors

- Countries are attempting to build resilient and diversified supply chains.
- Critical minerals are increasingly linked to national-security requirements.

Rare deal

The framework comes amid shortfall of critical metals in global markets after China imposed export curbs on rare earth elements

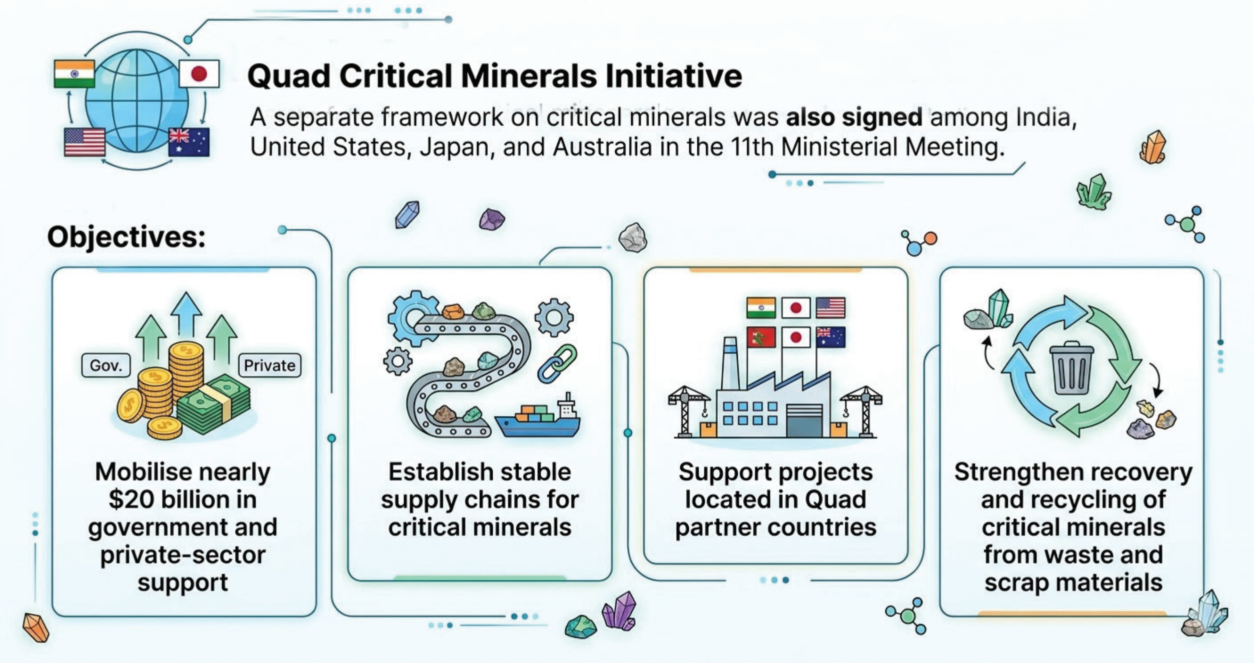
Framework seeks to:

- ■ **Deepen India-U.S. cooperation** across the critical minerals supply a rare earths chain, including mining, processing, pocessing, and related investments
- ■ Implement **effective management management** of critical minerals and minerals and rare scrap
- ■ Strengthen **resilient and resilient and diversified supply chains**
- ■ Promote **collaboration in financing**

Mining strategy: The agreement follows continued India-U.S. engagements, including India becoming a signatory to the U.S.-led Pax Silica initiative. REUTERS

Why does this matter for India?

- India relies heavily on **imports** for several critical minerals required for clean energy and advanced technologies.
- India aims to become a **manufacturing hub, an electronics producer, and a clean-energy economy.**
- All these sectors require secure access to critical minerals.
- Without stable supplies, battery manufacturing, semiconductor production, EV expansion, and renewable-energy deployment become strategically vulnerable.
- Therefore, critical mineral partnerships are now integral to India's industrial and strategic policy.

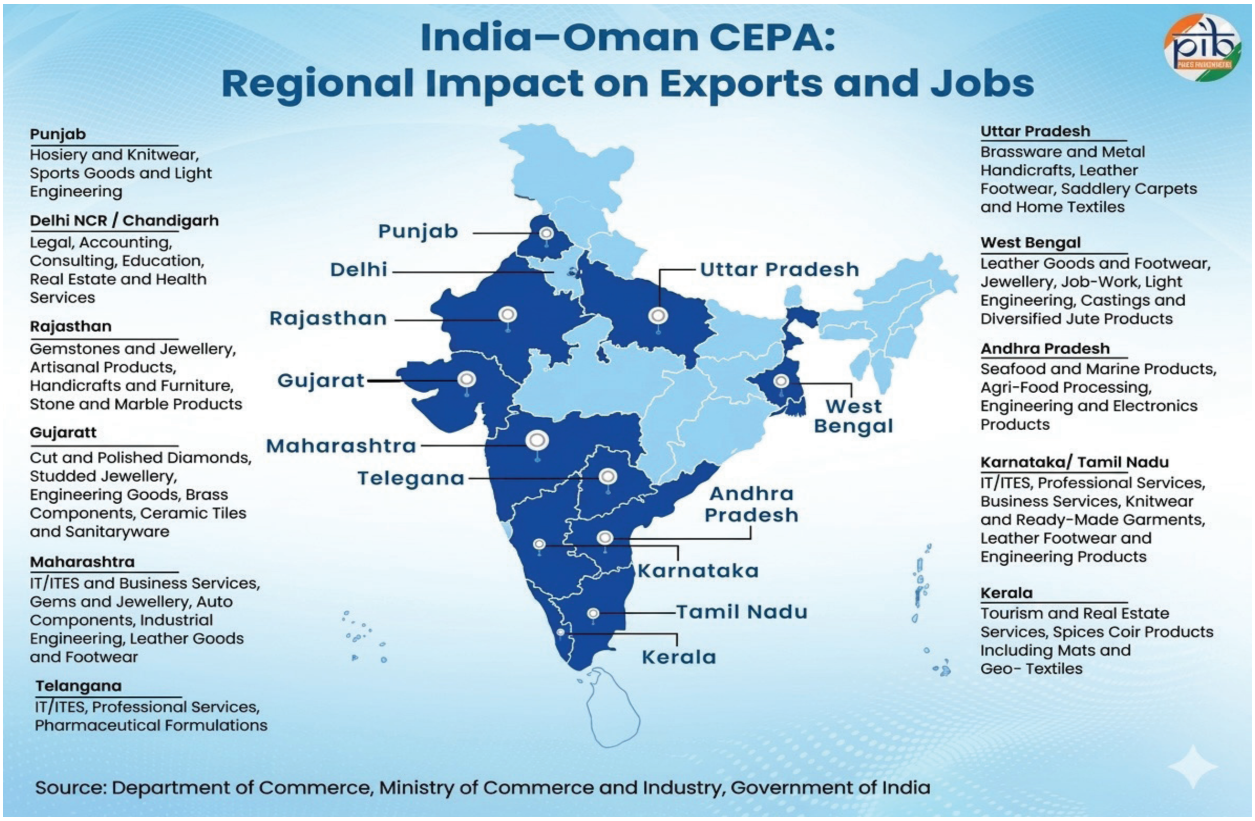


Quad Critical Minerals Initiative

A separate framework on critical minerals was **also signed** among India, United States, Japan, and Australia in the 11th Ministerial Meeting.

Objectives:

- Mobilise nearly $20 billion in government and private-sector support
- Establish stable supply chains for critical minerals
- Support projects located in Quad partner countries
- Strengthen recovery and recycling of critical minerals from waste and scrap materials



India–Oman CEPA: Regional Impact on Exports and Jobs

Punjab
Hosiery and Knitwear, Sports Goods and Light Engineering

Delhi NCR / Chandigarh
Legal, Accounting, Consulting, Education, Real Estate and Health Services

Rajasthan
Gemstones and Jewellery, Artisanal Products, Handicrafts and Furniture, Stone and Marble Products

Gujaratt
Cut and Polished Diamonds, Studded Jewellery, Engineering Goods, Brass Components, Ceramic Tiles and Sanitaryware

Maharashtra
IT/ITES and Business Services, Gems and Jewellery, Auto Components, Industrial Engineering, Leather Goods and Footwear

Telangana
IT/ITES, Professional Services, Pharmaceutical Formulations

Uttar Pradesh
Brassware and Metal Handicrafts, Leather Footwear, Saddlery Carpets and Home Textiles

West Bengal
Leather Goods and Footwear, Jewellery, Job-Work, Light Engineering, Castings and Diversified Jute Products

Andhra Pradesh
Seafood and Marine Products, Agri-Food Processing, Engineering and Electronics Products

Karnataka/ Tamil Nadu
IT/ITES, Professional Services, Business Services, Knitwear and Ready-Made Garments, Leather Footwear and Engineering Products

Kerala
Tourism and Real Estate Services, Spices Coir Products Including Mats and Geo- Textiles

Source: Department of Commerce, Ministry of Commerce and Industry, Government of India

What makes Oman important for India?

- One of India's oldest trading partners.
- Strategic location at the crossroads of **Gulf region, Indian Ocean, and East Africa**
- Bilateral trade increased from **$8.94 billion (FY2023-24)** to **$11.18 billion (FY2025-26)**.
- Its major ports (Sohar, Duqm, and Salalah) provide access to **Gulf Cooperation Council (GCC) markets, East African economies, and Global shipping routes**. Thus, Oman can function as both:
  - A destination market
  - A regional export hub

Most Favoured Nation (MFN)

A WTO principle under which a country must extend to one trading partner the same trade advantages offered to other trading partners, unless covered under a preferential trade agreement.

Export Inspection Council (EIC)

- Established under the Export (Quality Control and Inspection) Act, 1963.
- Functions under the Ministry of Commerce and Industry.
- Responsible for export quality assurance and certification.

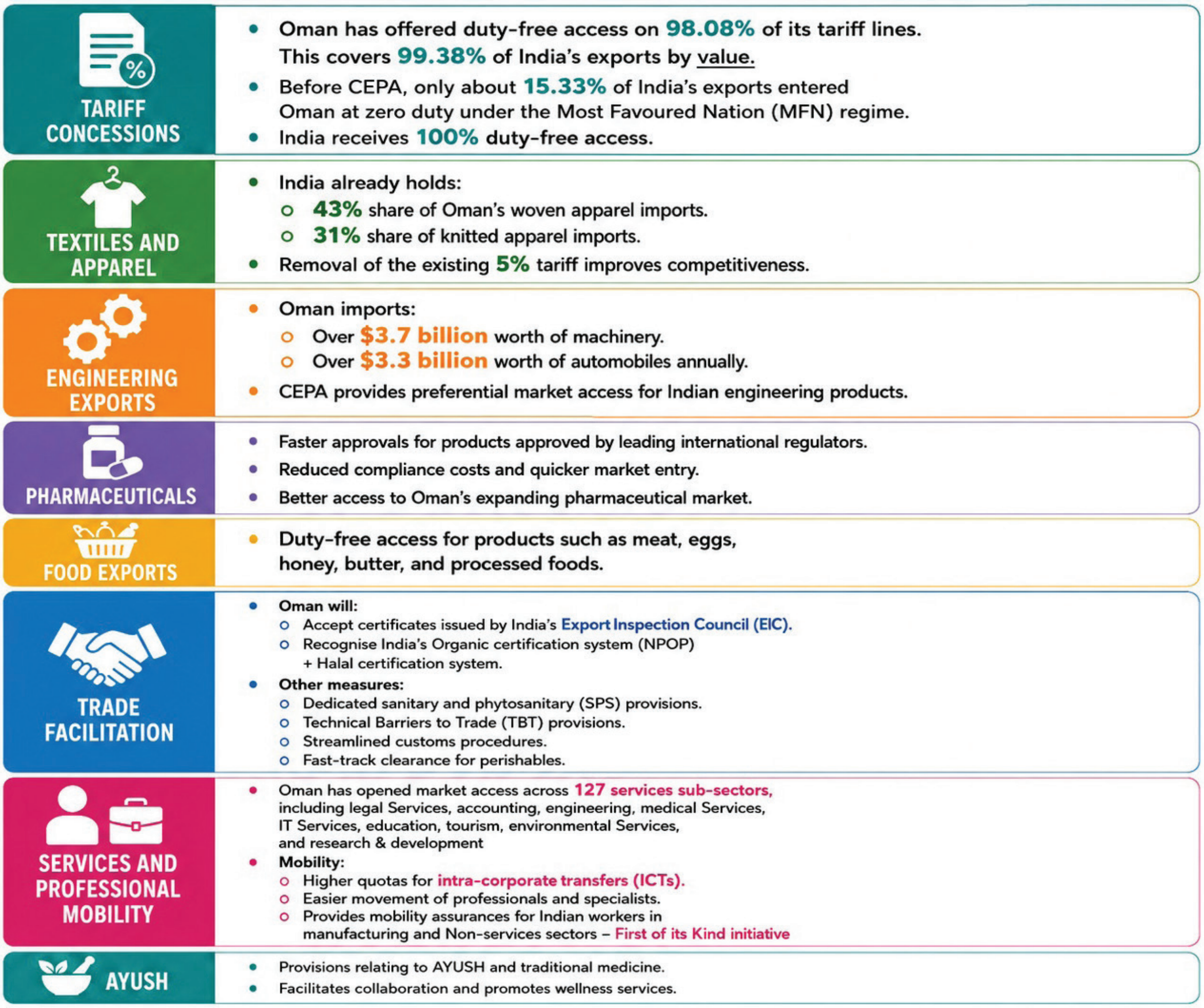
National Programme for Organic Production (NPOP): India's official organic certification framework for agricultural products.

Intra-Corporate Transferees: Employees of multinational companies temporarily transferred to overseas branches/subsidiaries.

How does this CEPA fit into India's trade strategy?

- Supports India's efforts to diversify export markets.
- Strengthens integration with global value chains.
- Builds upon recent trade agreements with UAE, Australia, EFTA, United Kingdom, New Zealand, and European Union.
- Enhances India's economic presence in the Gulf region.

Key benefits of the CEPA to India



TARIFF CONCESSIONS	• Oman has offered duty-free access on 98.08% of its tariff lines. This covers 99.38% of India's exports by value. • Before CEPA, only about 15.33% of India's exports entered Oman at zero duty under the Most Favoured Nation (MFN) regime. • India receives 100% duty-free access.
TEXTILES AND APPAREL	• India already holds: ○ 43% share of Oman's woven apparel imports. ○ 31% share of knitted apparel imports. • Removal of the existing 5% tariff improves competitiveness.
ENGINEERING EXPORTS	• Oman imports: ○ Over $3.7 billion worth of machinery. ○ Over $3.3 billion worth of automobiles annually. • CEPA provides preferential market access for Indian engineering products.
PHARMACEUTICALS	• Faster approvals for products approved by leading international regulators. • Reduced compliance costs and quicker market entry. • Better access to Oman's expanding pharmaceutical market.
FOOD EXPORTS	• Duty-free access for products such as meat, eggs, honey, butter, and processed foods.
TRADE FACILITATION	• Oman will: ○ Accept certificates issued by India's Export Inspection Council (EIC). ○ Recognise India's Organic certification system (NPOP) + Halal certification system. • Other measures: ○ Dedicated sanitary and phytosanitary (SPS) provisions. ○ Technical Barriers to Trade (TBT) provisions. ○ Streamlined customs procedures. ○ Fast-track clearance for perishables.
SERVICES AND PROFESSIONAL MOBILITY	• Oman has opened market access across 127 services sub-sectors, including legal Services, accounting, engineering, medical Services, IT Services, education, tourism, environmental Services, and research & development • Mobility: ○ Higher quotas for intra-corporate transfers (ICTs). ○ Easier movement of professionals and specialists. ○ Provides mobility assurances for Indian workers in manufacturing and Non-services sectors – First of its Kind initiative
AYUSH	• Provisions relating to AYUSH and traditional medicine. • Facilitates collaboration and promotes wellness services.

India - Nepal Relations: Boundary Dispute and Emerging Diplomatic Signals

Context:

Recent remarks by Nepal Prime Minister **K.P. Sharma Oli ("Balen")** in Nepal's Parliament on the India–Nepal boundary dispute over **Kalapani, Lipulekh and Limpiyadhura** that the dispute is **not one-sided** and should be resolved through **dialogue and diplomatic channels**, indicating a possible shift in the political discourse surrounding India–Nepal relations.

AFGHANISTAN
TIBET
PAKISTAN
NEPAL
BHUTAN
INDIA
BANGLADESH
Kolkata
BURMA (MYANMAR)
Hyderabad
Vijayawada
SRI LANKA
STEPMAP

What makes India - Nepal relations unique?

- India and Nepal share one of South Asia's most distinctive bilateral relationships based on:
- **Open Border System**
  - Nearly 1,700 km long open border
  - Free movement of people and goods
- **Civilisational and Cultural Ties**
  - Shared religious traditions
  - Deep people-to-people contacts
  - Common historical linkages
- **Economic Interdependence**
  - India is Nepal's largest trade partner
  - Nepal depends heavily on India for transit access
- **Security Cooperation**
  - Long-standing military cooperation
  - Recruitment of Gorkha soldiers
  - Close coordination between security establishments
- **Special Relationship Framework:** The relationship is often described as one of **interdependence rather than conventional diplomacy**.

Existing Cooperation Architecture

- **Open Border Framework** facilitates trade, labour mobility. social interaction, and cultural exchange.
- **Defence and Military Cooperation:**
  - Long-standing institutional relationship between the Indian and Nepalese armies.
  - Military cooperation acts as a stabilising factor during political disagreements.
- **Economic and Connectivity Cooperation:**
  - Trade and transit arrangements.
  - Cross-border infrastructure projects.
  - Energy cooperation.

Why has the boundary dispute become a recurring irritant?

Structural factors:

- **Colonial-era boundary ambiguities:**
  - **Key dispute areas:** Kalapani, Lipulekh, and Limpiyadhura
  - Both countries rely on different interpretations of historical maps and river origins.

- All these disputed areas lie near the **India–Nepal–China tri-junction**
- Lipulekh serves as an important route for **Kailash Mansarovar Yatra and India–China border trade.**

Stand on border dispute

- **Nepal's Position**
  - It claims Kalapani, Lipulekh and Limpiyadhura as part of its territory.
  - Has incorporated these claims into its official maps.
- **India's Position**
  - Relies on inherited British-era boundary delineations.
  - Considers the areas part of India.
  - Emphasises strategic and security considerations, particularly regarding the tri-junction region with China.

- **Strategic geography of the region:**
  - The disputed area lies near the:
    - India–Nepal border
    - India–China frontier
  - This gives the issue strategic importance beyond territorial claims.
- **Rise of nationalist politics:** Boundary issues periodically become linked to domestic political narratives in both countries.

  - Territorial issues often become symbols of sovereignty and national identity.
  - Domestic political pressures can harden negotiating positions.
- **Influence of external geopolitical factors:** India–China tensions often indirectly affect perceptions surrounding the dispute.

What are the emerging positive trends in India - Nepal relations?

- **Acceptance of mutual concerns:** Nepal's Prime Minister acknowledged that territorial claims may involve concerns on both sides rather than a one-sided dispute.
- **Preference for diplomatic dialogue over confrontation:** Both countries have reiterated commitment to resolving differences through negotiation rather than escalation.
- **Generational Political Shift in Nepal:** Instead of ideological confrontation, the younger political leadership in Nepal prioritises:
  - Economic development
  - Employment generation
  - Connectivity
  - Investment
- **Recognition of economic interdependence:** There is growing understanding in Nepal that:
  - India remains crucial for trade, connectivity and development.
  - Long-term prosperity requires stable bilateral relations.
- **Continued diplomatic engagement:** High-level political and diplomatic exchanges have continued despite disagreements.

What is the diplomatic path ahead for both nations?

Incremental measures

- **Sustain diplomatic dialogue:**
  - Regular political consultations.
  - Continued engagement between foreign ministries.
- **Promote expert-level discussions:**
  - Historical, cartographic and legal experts can help clarify competing claims.
  - Reduce politicisation of technical issues.
- **Insulate cooperation from disputes:** Ensure trade, connectivity and people-to-people exchanges continue irrespective of boundary disagreements.

Disruptive measures

- **Shift from territorial contestation to relationship management**
  - Prevent boundary disputes from defining the entire bilateral relationship.
  - Prioritise broader strategic and developmental cooperation.
- **Build a mutually acceptable practical solution** based on:
  - Centuries-old multifaceted linkages.
  - Historical traditions of open borders.
  - Strong institutional trust between the two countries.
- **Develop a sustainable partnership model:** Move towards a relationship based on:
  - Mutual respect
  - Economic cooperation
  - Strategic trust
  - Shared regional stability

Conclusion:

India and Nepal share a relationship built on geography, culture and mutual dependence that cannot be reduced to a boundary dispute alone. A pragmatic approach that combines dialogue, economic cooperation and respect for each other's sensitivities can help transform periodic tensions into a more stable and sustainable partnership under India's Neighbourhood First policy.

India–Russia RELOS (Reciprocal Exchange of Logistics Agreement)

Context:

The India-Russia Logistics Support Agreement (LSA), called the **Reciprocal Exchange of Logistics Agreement (RELOS)**, became operational in January 2025. The agreement attracted attention following claims that it would permit stationing of Russian troops in India or vice versa.

What is RELOS?

- A **military logistics support agreement** that allows the armed forces of India and Russia to access each other's military facilities for logistical support during agreed activities.
- It facilitates:
  - Refuelling of ships and aircraft
  - Repair and maintenance services
  - Port calls by naval vessels
  - Access to airbases and military facilities
  - Medical and technical support
  - Logistical support during exercises, training and Humanitarian Assistance and Disaster Relief (HADR) operations

What are Logistics Support Agreements (LSA's)?

- Military cooperation arrangements that facilitate reciprocal logistical support between armed forces of partner countries.
- Modern military operations involve:
  - Joint military exercises
  - Naval deployments
  - Humanitarian Assistance and Disaster Relief (HADR)
  - Anti-piracy missions
  - Long-range deployments
- Without logistics agreements, every refuelling, repair or resupply requires separate diplomatic clearances and commercial arrangements.
- Their primary objective is to simplify military-to-military cooperation and reduce administrative delays.

Does RELOS allow troop stationing?

- No, the agreement only allows temporary access to military facilities for logistics support.
- Does not allow:
  - Permanent military bases.
  - Permanent deployment of troops.
  - Long-term stationing of military assets.
  - Military alliance obligations.
- Official clarifications state that any deployment under RELOS is limited to mutually agreed visits, exercises, port calls or operations.

What activities are covered under RELOS?

- **Military Exercises:** Bilateral and multilateral exercises and also joint training programmes.
- **Naval Cooperation:** Port visits, refuelling and replenishment, and maintenance support.
- **Air Force Operations:** Use of airfields, refuelling of aircraft, and technical support.
- **HADR Missions:** Disaster relief operations and humanitarian assistance missions.

How is RELOS Different from a Military Alliance?

RELOS	Military Alliance
Logistics support agreement	Collective defence arrangement
No obligation to fight together	Members may be required to defend each other
No permanent troop deployment	Can involve military presence
Focus on operational support	Focus on security commitments
Administrative arrangement	Strategic defence pact

What is the strategic significance of RELOS?

- **Enhances Arctic Access:** RELOS provides Indian forces easier access to Russian military facilities in the Arctic region, which is gaining importance due to emerging shipping routes and resource opportunities.
- **Expands Maritime Reach:** Supports Indian naval deployments across arctic waters, North Atlantic and Russian Far East.
- **Supports Defence Cooperation:** Complements:
  - Joint exercises
  - Defence technology cooperation
  - Military-to-military engagement
- **Strengthens Multipolar Partnerships:** Reflects India's policy of engaging multiple partners without entering formal military alliances.

US-Iran Peace Framework Agreement, 2026

Context:

The United States and Iran have reached a **14-point framework Memorandum of Understanding (MoU)** aimed at ending the recent conflict, reopening the Strait of Hormuz, initiating sanctions relief, and creating a pathway for negotiations on Iran's nuclear programme.

Why is Iran's nuclear programme a global issue?

The dispute revolves around **uranium enrichment**.

- Iran argues that enrichment is necessary for
  - Peaceful nuclear energy (Civilian Energy Generation)
  - Medical research
  - scientific purposes.
- The U.S., Israel and several Western countries fear that highly enriched uranium can be diverted for nuclear weapons production.
- Therefore, the central issue is not nuclear energy itself, but the **extent of enrichment, stockpiling, and verification mechanisms**.
- Nuclear reactors and nuclear weapons require uranium of different purity levels.

Type	Uranium Enrichment
Civilian nuclear fuel	Low enriched uranium
Weapons-grade material	Highly enriched uranium

Key commitments

U.S. Commitments: The U.S. agreed to:

- Lift sanctions on Iranian products and services.
- Facilitate access to frozen Iranian assets.
- Ease restrictions on:
    - Crude oil exports
    - Petrochemical exports
    - Banking and financial services
- Remove naval blockade measures.
- Work towards an economic recovery package reportedly worth around **$300 billion**.

Iran's Commitments: Iran agreed to:

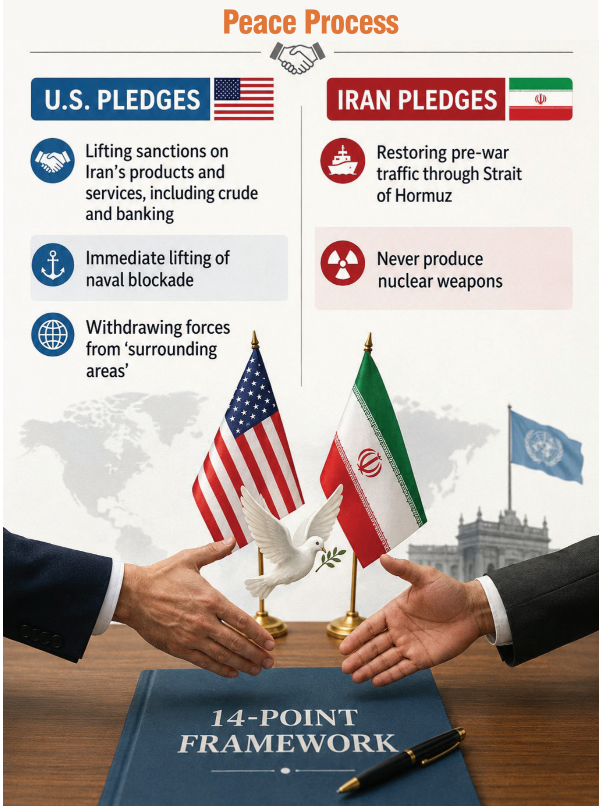
- Never produce nuclear weapons.
- Maintain the current status of its nuclear programme during negotiations.
- **Dilute (down-blend)** highly enriched uranium under international supervision.
- Allow restoration of maritime traffic through the Strait of Hormuz.

What is Down-blending of Uranium?

- Mixing highly enriched uranium with lower-grade uranium to reduce its enrichment level/concentration.
    - Natural uranium contains a very small percentage of fissile Uranium-235.
    - **Enrichment** increases the concentration of Uranium-235.
- This will,
    - Reduce proliferation risks.
    - Make uranium less suitable for weapons purposes.
    - Allow continued civilian use in nuclear energy programmes.
    - Often used as a confidence-building measure in arms-control agreements.

What's so significant about this deal?

- **Moving beyond a purely nuclear framework:** Unlike the 2015 Joint Comprehensive Plan of Action (JCPOA), which focused primarily on nuclear restrictions in exchange for sanctions relief, the present framework attempts to address broader US-Iran tensions, regional security concerns, economic reconstruction, and maritime security.
- **Reflection of changing regional priorities:** Many regional powers are prioritising economic development, stability, connectivity, and energy security over prolonged geopolitical confrontation.
- **Sign of strategic fatigue with conflict:** The agreement reflects:
    - Growing US fatigue with prolonged military engagement in West Asia.
    - Iran's need for economic recovery after years of sanctions and conflict.


Peace Process
U.S. PLEDGES
Lifting sanctions on Iran's products and services, including crude and banking
Immediate lifting of naval blockade
Withdrawing forces from 'surrounding areas'
IRAN PLEDGES
Restoring pre-war traffic through Strait of Hormuz
Never produce nuclear weapons
14-POINT FRAMEWORK

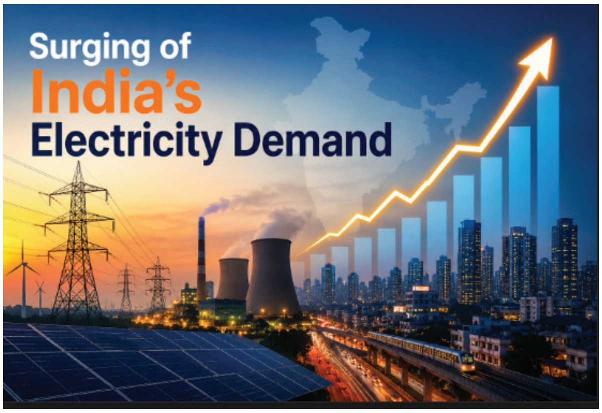
What are its implications for India?

- **Energy Security**
    - Reduced risk of disruption in oil supplies.
    - Greater stability in Strait of Hormuz, through which a substantial share of India's energy imports pass.
- **Indian Diaspora:** Improved regional stability benefits millions of Indians living and working in West Asia.
- **Connectivity and Trade:** Reduced geopolitical tensions can support regional trade and connectivity initiatives.
- **Strategic Space:** Provides India greater room to engage all major regional actors simultaneously.

Conclusion:

The US–Iran agreement does not yet establish a new regional order, but it signals a shift from confrontation towards managed competition. Its success will depend less on the framework itself and more on whether regional powers can convert temporary de-escalation into a durable architecture of stability and economic cooperation.

India's Surging Power Demand



Context:

India's electricity demand has increased sharply, with **peak demand** touching an all-time high of **256.1 GW in April 2026**, increasing pressure on States to manage electricity supply during high-demand summer periods.

Peak demand refers to the **highest level of electricity consumption on the grid** during a specific period.

- Summer peaks usually occur afternoon to evening due to cooling demand
- Additional peaks emerge morning and evening because of lighting and household consumption.

How do states manage electricity demand?

- **Long-term contractual supply:** DISCOMs sign Power Purchase Agreements (PPAs) with generators.
    - Around **85–90%** of India's electricity demand is met through long-term contracts.
- **Short-term power exchanges**
    - Used when contractual supply becomes insufficient.

  - States purchase electricity from power exchanges during sudden demand spikes.
- **Demand-side management measures:** States increasingly use,
  - Time-of-Day (ToD) tariffs
  - Consumer advisories to reduce peak consumption
  - Smart-meter-linked demand management

What is driving the surge in electricity demand?

Structural factors

- **Electrification expansion:** Rising **household** electrification
- **Rising cooling demand:** Increasing **air-conditioner penetration**
- **EV adoption:** Growth in **electric vehicle** usage
- Expanding **agricultural** electricity demand
- **Urbanisation and industrialisation:** Rapid **urbanisation** and commercial electricity consumption

Cyclical factors

- Sharp evening demand peaks
- Seasonal weather variability
- Misalignment between renewable-energy generation and demand patterns
- Greater dependence on costly short-term electricity markets during peak periods

India's rising electricity demand reflects the growing complexity of managing a rapidly electrifying economy. Long-term grid stability will depend not only on expanding power generation but also on strengthening distribution infrastructure, improving renewable-energy integration, and building flexible energy-storage systems.

What are the challenges faced by states in managing power demand?

- **Distribution-network stress:** India's distribution infrastructure remains under pressure despite growth in generation capacity.
  - Overloaded transformers and feeders
  - Ageing distribution infrastructure
  - Inadequate maintenance
  - High technical and commercial losses in some States
  - Nearly 13 lakh distribution transformers reportedly fail annually in India.
- **Financial stress on DISCOMs**
  - Peak-period market purchases become extremely expensive.
  - Exchange prices reportedly touched ₹10 per kilowatt-hour during peak periods.
  - Financially stressed States face difficulty in:
    - Procuring costly short-term electricity
    - Investing in grid modernisation
- **Renewable-energy integration challenge**
  - Solar generation falls sharply after sunset.
  - Wind generation remains seasonal and weather-dependent.
  - Demand peaks often occur when renewable output declines.

Role of Renewable energy in managing power demand

- **Solar-rich States** such as Gujarat and Karnataka, benefit from strong daytime solar generation reducing daytime demand pressure.
- **Wind-rich States** like Tamil Nadu benefit during high wind-output periods, especially during monsoon months.
- **Hydro-dependent balancing** states such as Punjab depend more on Hydro imports and Short-term market purchases during summer peaks.

What needs to be done to manage rising peak demand?

Incremental measures

- Expand **Battery Energy Storage Systems (BESS)**
- Scale **Pumped Hydro Storage (PHS)**
- Build smarter and more flexible electricity grids
- Integrate **renewable-energy forecasting** into grid operations
- Develop advanced peak-demand management systems
- Align agricultural and household consumption with grid conditions

Disruptive measures

- Expand transmission and distribution infrastructure
- Strengthen DISCOM finances
- Promote smart meters and demand-side management
- Expand **Time-of-Day tariffs**
- Improve maintenance of transformers and feeders

Conclusion:

India's rising electricity demand reflects the growing complexity of managing a rapidly electrifying economy. Long-term grid stability will depend not only on expanding power generation but also on strengthening distribution infrastructure, improving renewable-energy integration, and building flexible energy-storage systems.

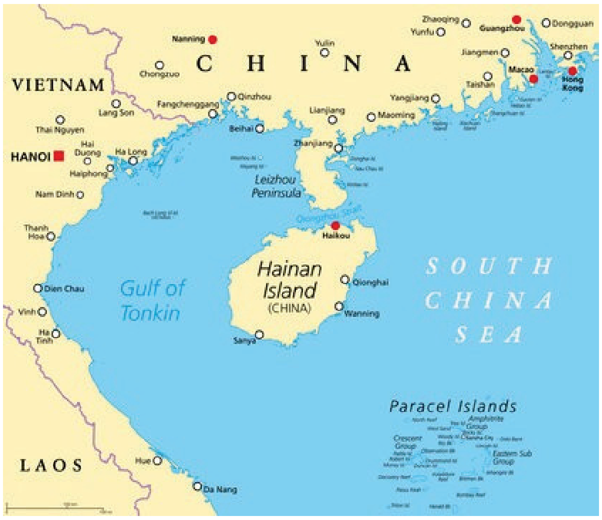
Hainan Free Trade Port

Context:

China operationalised Hainan FTP to promote trade liberalisation, tourism, logistics and foreign investment.

What is a Free Trade Port?

- A **special economic zone** with,
  - relaxed (minimal) customs regulations,
  - **lower tariffs** and simplified trade procedures,
  - easier movement of goods, services, capital and people.
  - **Re-export** trade (Goods processed and exported again)
- **Features of Hainan FTP:**
  - Island-wide customs mechanism
  - Zero/low tariffs
  - Duty-free shopping
  - Visa-free access for several countries
  - Simplified trade procedures
  - Encouragement for foreign enterprises


CHINA
VIETNAM
LAOS
HANOI
Nanning
Chongzuo
Yulin
Zhaoqing
Yunfu
Guangzhou
Dongguan
Jiangmen
Shenzhen
Macao
Hong Kong
Taishan
Yangjiang
Maoming
Lianjiang
Qinzhou
Fangchenggang
Beihai
Zhanjiang
Lang Son
Thai Nguyen
Hai Duong
Ha Long
Haiphong
Nam Dinh
Thanh Hoa
Dien Chau
Vinh
Ha Tinh
Hue
Da Nang
Leizhou Peninsula
Haikou
Hainan Island (CHINA)
Qionghai
Wanning
Sanya
Gulf of Tonkin
SOUTH CHINA SEA
Paracel Islands
Amphitrite Group
Crescent Group
Eastern Sub Group

Places in news - Hainan

- Mainland Chinese Province
- Located in **South China Sea** (one of the world's busiest maritime trade corridors)
- **Type:** Tropical Island Province
- It is located near major shipping routes connecting East Asia, Southeast Asia, Indian Ocean, and Pacific trade networks.

Why is China developing this Port?

China is trying to:

- reduce dependence on **Hong Kong,**
- create alternate global financial/trade hubs,
- strengthen mainland-controlled economic gateways.
- Expand Chinese influence in South China Sea

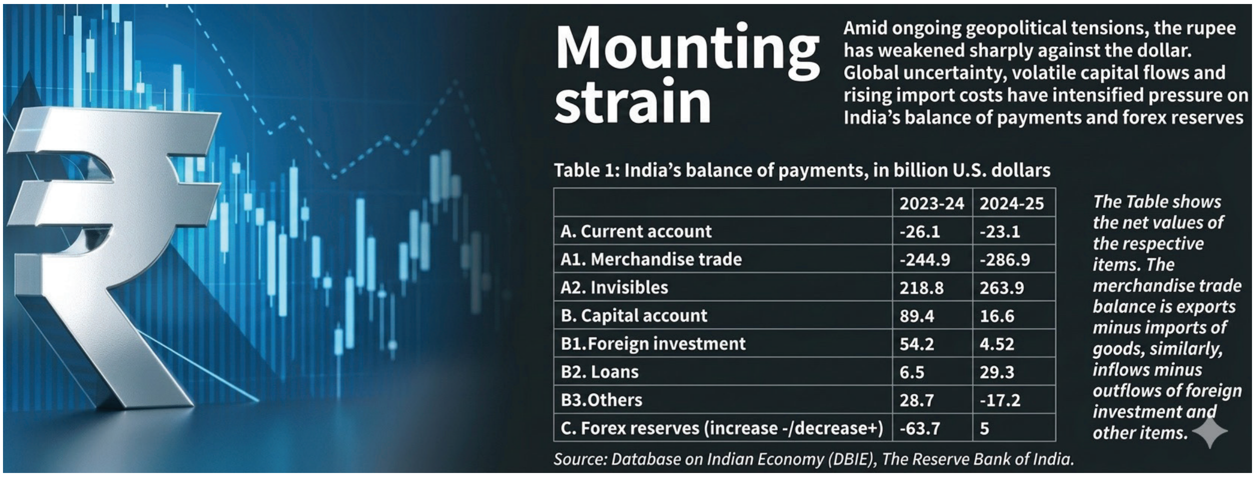
IMPORTANT ECONOMIC TERMS

Term	Meaning
Free Trade Port (FTP)	Large trade zone with minimal customs barriers and liberalised trade regime
Free Trade Agreement (FTA)	Agreement between countries to reduce tariffs
Special Economic Zone (SEZ)	Industrial/export zone with tax incentives
Customs-Free Zone	Region with simplified customs procedures
Duty-Free	Goods exempt from customs duty/tax
Bonded Warehouse	Imported goods stored without immediate duty payment
Re-export Trade	Importing goods for later export
Tariff	Tax imposed on imports
Trade Liberalisation	Reduction of trade restrictions
Export Processing Zone (EPZ)	Area focused mainly on export manufacturing

Indian Rupee depreciation

Context:

The Indian rupee has depreciated sharply against the U.S. dollar, crossing **₹96 per dollar.**



Mounting strain

Amid ongoing geopolitical tensions, the rupee has weakened sharply against the dollar. Global uncertainty, volatile capital flows and rising import costs have intensified pressure on India's balance of payments and forex reserves

Table 1: India's balance of payments, in billion U.S. dollars

	2023-24	2024-25
A. Current account	-26.1	-23.1
A1. Merchandise trade	-244.9	-286.9
A2. Invisibles	218.8	263.9
B. Capital account	89.4	16.6
B1.Foreign investment	54.2	4.52
B2. Loans	6.5	29.3
B3.Others	28.7	-17.2
C. Forex reserves (increase -/decrease+)	-63.7	5

The Table shows the net values of the respective items. The merchandise trade balance is exports minus imports of goods, similarly, inflows minus outflows of foreign investment and other items.

Source: Database on Indian Economy (DBIE), The Reserve Bank of India.

Economic Logic of Rupee Value

The value of a currency is determined by demand and supply in the foreign exchange market.

Rupee Appreciates When:

- exports rise (Foreigners purchase Indian goods and services),
- foreign investment inflows increase,
- remittances increase,
- forex inflows exceed outflows.

Rupee Depreciates When:

- imports rise sharply (India imports goods such as crude oil),
- foreign investors pull out capital,
- demand for dollars increases (Indians travel abroad),
- current account deficit widens.

Thus Rupee depreciation is fundamentally linked to India's external sector imbalance.

How do the core economic factors drive rupee depreciation?

- ***Trade deficit:***
  - India imports more than it exports, especially crude oil, electronics, gold, and machinery.
  - Higher oil prices mean:
    - more dollar payments for imports,
    - larger import bill,
    - increased pressure on foreign exchange reserves.
  - Importers demand more dollars as a result Indian firms pay foreign sellers in dollars.
  - Demand for dollars rises, weakening the rupee.
  - Trade Deficit expands as merchandise imports exceed merchandise exports.
  - Current Account Deficit (CAD) Worsens as the net outflow of foreign currency rises.
  - Rupee Depreciates as more rupees are needed to buy one dollar.
- ***Current Account Deficit (CAD)***
  - Current Account includes merchandise trade, services, remittances, income transfers.
  - India usually runs merchandise trade deficit, but partially offsets it through IT exports, remittances, and services exports.
  - Still, India often faces Current Account Deficit (CAD).
- ***Foreign Portfolio Investment (FPI) Outflows***
  - FPIs involve investment in stocks, bonds, and financial markets.
  - These are highly liquid, short-term, sentiment-driven.
  - When FPIs enter India dollars enter Indian markets, rupee demand rises, and rupee strengthens.
  - When FPIs exit, investors sell Indian assets, convert rupees into dollars, dollar demand rises, and the rupee weakens sharply.
  - FPIs move quickly across countries seeking higher returns.

  - Thus FPI flows significantly influence exchange-rate volatility.
  - Recent pressures were linked to Global geopolitical tensions, higher U.S. interest rates, and investors shifting funds to safer markets
- ***Rising U.S. Interest Rates***
  - Higher U.S. interest rates:
    - Make American assets more attractive
    - Trigger capital outflows from emerging economies
    - Increase pressure on currencies like the rupee
  - This creates external-sector stress, pressure on foreign exchange reserves, and imported inflation risks.

What is the impact of Rupee depreciation?

- ***Negative* impacts**
  - Imports become costlier, especially crude oil
  - Fuel inflation rises
  - Production and transport costs increase
  - External-sector vulnerabilities widen
  - Example: If oil prices remain constant in dollars, a weaker rupee still increases India's import bill.
- ***Potential* export advantage**
  - Indian exports become relatively cheaper globally
  - **Export competitiveness** may improve
  - **Ex:** A shirt exported at $15 earns more rupees after depreciation.
  - However gains may remain limited because Indian manufacturing also depends heavily on imported inputs.

Role of RBI in such situations

When Rupee Falls Sharply:

RBI:

- sells dollars from forex reserves,
- buys rupees from the market.

Result:

- dollar supply increases,
- rupee demand rises,
- depreciation slows.

How can India strengthen external resilience?

Incremental measures

- Strengthen forex reserves
- Improve export competitiveness
- Regulate speculative capital flows
- Maintain macroeconomic stability
- Disruptive measures
- Reduce dependence on imported oil
- Diversify energy sources
- Deepen domestic manufacturing capacity
- Reduce vulnerability to volatile short-term capital flows

Conclusion:

The depreciation of the rupee reflects deeper external-sector vulnerabilities linked to trade imbalances, energy dependence, and volatile global capital flows. Strengthening India's long-term economic resilience will require a more competitive export base, reduced import dependence, stronger domestic manufacturing, and stable macroeconomic management in an increasingly uncertain global economy.

India - Australia CECA

Context:

With Australian Foreign Minister Penny Wong visiting India during the Quad Foreign Ministers' meeting, discussions have intensified around a possible **India–Australia Comprehensive Economic Cooperation Agreement (CECA)**.

What is CECA?

- A **Free Trade Agreement (FTA)** is an agreement between countries to reduce or eliminate barriers such as tariffs, quotas, and regulatory restrictions.
- A **Comprehensive Economic Cooperation Agreement (CECA)** goes beyond tariff reduction.
- It may include trade in goods, services, investment, technology cooperation, regulatory coordination, mobility and standards alignment.
- CECA represents a broader economic partnership, **not just a trade deal.**

Why are India and Australia strategically important to each other?

- Both countries are:
  - Quad partners

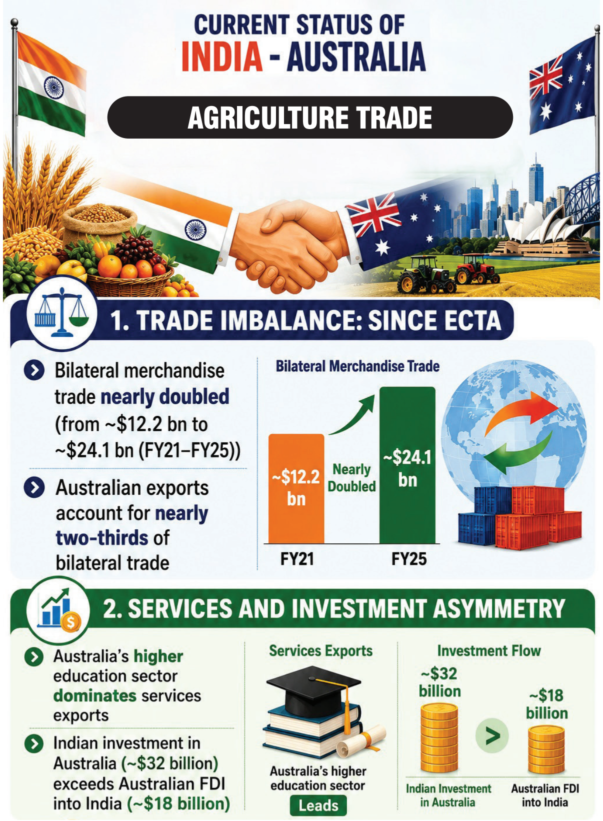
- Indo-Pacific democracies
  - Seeking supply-chain diversification
  - Concerned about resilient trade architecture
- Economic cooperation complements strategic convergence. To achieve this CECA plays a major role.

Why is CECA strategically important for India?

- Geopolitical uncertainty and tariff disruptions are reshaping global trade.
- India seeks diversification of trade partnerships.
  - Australia's Economic Engagement Roadmap for India focuses on clean energy, education, tourism, and agribusiness.
- Expanding exports and investment has become important for external-sector stability.

What is the existing India - Australia trade framework?

- **ECTA (Economic Cooperation and Trade Agreement), 2022**
  - Opened 100% of Australian market access for India
  - India reciprocated with phased market access covering ~70% tariff lines
  - Covered nearly 91% of bilateral trade value.
- CECA is expected to deepen and expand this arrangement. But differences in **agriculture** are hindering the deal.


CURRENT STATUS OF
INDIA - AUSTRALIA
AGRICULTURE TRADE

1. TRADE IMBALANCE: SINCE ECTA

- Bilateral merchandise trade **nearly doubled** (from ~$12.2 bn to ~$24.1 bn (FY21–FY25))
- Australian exports account for **nearly two-thirds** of bilateral trade

2. SERVICES AND INVESTMENT ASYMMETRY

- Australia's **higher** education sector **dominates** services exports
- Indian investment in Australia **(~$32 billion)** exceeds Australian FDI into India **(~$18 billion)**

Services Exports
Australia's higher education sector
Leads
Investment Flow
~$32 billion
>
~$18 billion
Indian Investment in Australia
Australian FDI into India

Why is agriculture becoming the core issue in CECA negotiations?

- **Different agriculture realities**

  Australia
  - Large-scale export-oriented farming
  - Average farm size: ~1,400 hectares

  India
  - Smallholder agriculture
  - Average farm size: ~0.73 hectares
  - Agriculture supports livelihoods and food security
- **India's apprehensions:**
  - India fears cheaper imports in sectors such as dairy, wheat, rice, sugar, and chickpeas because Indian farmers remain vulnerable to:
    - Monsoon variability
    - Fragmented landholdings
    - Thin profit margins
  - Agriculture is not just a trade issue for India; it is also a livelihood and political issue.
- **Asymmetry in agriculture trade:** Despite restrictions,
  - Australian agricultural exports to India reportedly increased by nearly 90%.
  - Indian agricultural exports to Australia reportedly grew by only around 35%.

How will cooperation in agriculture benefit India?

- India reportedly **loses ~15–35%** agricultural output annually due to pests, disease, and post-harvest inefficiencies.
- Australia can support India through:
  - Precision farming technologies
  - Cold-chain systems
  - Water management expertise
  - Climate-resilient agriculture
  - Post-harvest management

India–Australia Smart Farm Network Initiative

- The initiative seeks to strengthen cooperation in:
    - Precision farming
    - Climate-resilient agriculture
    - Water-management practices
    - Agri-technology partnerships
    - Farm-level innovation
- It promotes collaboration between firms, universities, and local governments
- The initiative aims to facilitate:
    - Technology transfer
    - Knowledge sharing
    - Agricultural modernisation
    - Improved post-harvest and farm-management systems

What is needed to strengthen agricultural cooperation through CECA?

Incremental measures

- Cooperation in biosecurity and phytosanitary standards
- Digital certification systems
- Alignment of quarantine protocols and regulatory systems
- Institutional collaboration in agri-technology and research

Long-term measures

- Investments in cold-chain infrastructure
- Expansion of storage and logistics networks
- Greater Australian technology and investment participation in India's agricultural sector

Conclusion:

India–Australia economic ties will succeed not through tariff parity alone, but through complementarity in technology, investment, and resilient supply chains that balance trade expansion with livelihood security and strategic trust.

India's Critical National Infrastructure: Security limitations

Context:

India's critical infrastructure systems are becoming increasingly digital through **automation, Artificial Intelligence (AI), and the Internet of Things (IoT)**. Though this improves efficiency and monitoring, it also expands vulnerabilities to cyberattacks, data manipulation, and disruptions in essential services.

What is Critical National Infrastructure (CNI)?

- Systems and assets essential for the functioning of society and the economy.
- **Examples:** Power grids, Oil refineries, Railways and airports, Banking systems, Telecom networks, Water supply systems, and Hospitals and public utilities.
- Disruption in these systems can affect:
    - Economic stability
    - Public safety
    - National security
- This infrastructure is **shifting from isolated physical systems to interconnected digital** ecosystems.
    - Automation systems
    - Sensors and smart devices
    - IoT networks
    - AI-based monitoring
    - Remote-control systems

Internet of Things (IoT)

- Interconnected physical devices capable of collecting and exchanging data over networks.
- **Examples:** smart sensors, GPS systems, industrial controllers, surveillance cameras.

Operational Technology (OT)

- Hardware and software used to **monitor and control industrial operations and physical infrastructure.**
- Used in, power plants, manufacturing systems, transportation networks.

Why is India's critical infrastructure becoming vulnerable?

Structural factors

- **Rapid digitalisation without equivalent security upgrades:** Infrastructure expansion has outpaced:
    - Cybersecurity preparedness
    - Device verification
    - Security audits
- **Weak certification and procurement scrutiny:** Security assessments often rely on compliance templates rather than deep technical verification.
- **Dependence on imported devices:** Many sensors, cameras, industrial controllers, tracking systems are imported.
    - Risks arise if devices contain hidden vulnerabilities, malicious firmware,

embedded data-sharing functions.

- **Convergence of IT and OT systems:**Previously isolated operational systems are now internet-connected.
  - **E.g.:** Fuel transport moved from **physical seals and locks to GPS-enabled digital tracking and e-lock** systems.
  - A cyber breach can now disrupt physical infrastructure directly.

Operational factors

- **Expanding attack surface:** Billions of connected devices increase vulnerability points.
- **Inadequate enforcement of IoT security standards:** Security frameworks are uneven across sectors.
- **Limited monitoring and cyber preparedness:** Many public utilities lack:
  - advanced monitoring,
  - real-time threat detection,
  - trained cybersecurity personnel.
- **Supply-chain vulnerabilities:** Compromised imported components can create backdoor access, and remote manipulation risks.

What is India doing to improve security?

- **Existing measures:**
  - CERT-In is India's nodal cyber incident response agency
  - Protective cybersecurity laws
  - IoT guidelines
  - **Standardisation Testing and Quality Certification (STQC)** recently expanded to some surveillance devices
    - The certification aims to ensure devices do not contain unintended control or data-sharing mechanisms.
- **Atmanirbhar Bharat Push:** India emphasises on trusted indigenous technologies and secure procurement practices.

IT vs OT

Information Technology (IT)	Operational Technology (OT)
Handles data & communication	Controls physical systems
Digital information focus	Industrial operations focus
Examples: emails, databases	Examples: turbines, control systems

How can India strengthen critical infrastructure security?

Incremental measures

- Strengthen **certification standards** for IoT devices used in critical infrastructure
- Improve procurement scrutiny and deep security evaluation
- Expand continuous **monitoring of connected infrastructure** systems
- **Build awareness** among operators of critical infrastructure

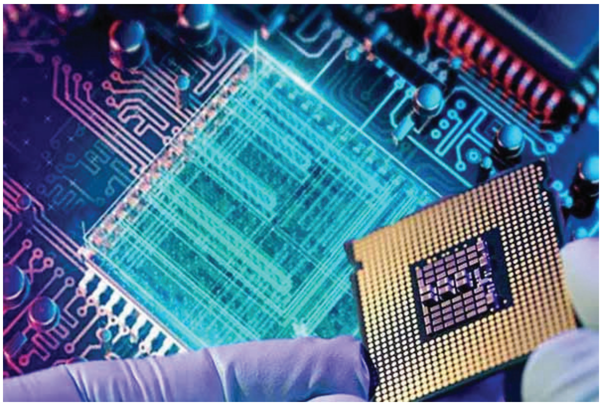
Disruptive measures

- Promote **trusted indigenous hardware** ecosystems
- Develop stronger **national cyber-security architecture** for OT and IoT systems
- **Reduce strategic dependence** on vulnerable imported digital infrastructure
- Integrate cyber-security, supply-chain security, and infrastructure governance into **national security planning.**
- Create **dedicated critical infrastructure cyber command** systems
- Separate sensitive OT systems from public internet exposure

Conclusion:

As infrastructure becomes increasingly digital, cybersecurity becomes inseparable from national security. India's resilience will depend on trusted technologies, secure procurement, stronger certification systems, and continuous protection of critical infrastructure ecosystems.

Memflation



Context:

The global semiconductor industry is witnessing severe "memflation"

- A semiconductor is **a material whose electrical conductivity lies between conductors and insulators.**
- **Examples:** Silicon, Germanium.
- Semiconductors form the foundation of:
  - Smartphones and consumer electronics
  - Computers and data centres
  - Artificial Intelligence (AI) systems
  - Telecommunications equipment
  - Automobiles and EVs
  - Defence and aerospace systems
- They are often called the **"oil of the digital economy".**

What is Memflation?

- Inflation driven by shortages and rising prices of memory chips (semiconductor memory components) such as:
  - DRAM (Dynamic Random Access Memory),
  - and NAND flash memory.

Dynamic Random Access Memory (DRAM) is **temporary working memory** used in:

- smartphones,
- laptops,
- servers,
- and computers.

It stores data actively required by the processor.

NAND Flash Memory: NAND is **non-volatile memory** used for:

- long-term storage,
- smartphone data storage,
- SSDs,
- and electronic devices.

Unlike DRAM, **NAND retains data even when power is switched off**. Both are essential components in consumer electronics manufacturing.

Why is the global semiconductor industry facing memflation?

- **Shift towards AI infrastructure:** Global semiconductor manufacturers are allocating: Wafer capacity and advanced packaging infrastructure towards **High-Bandwidth Memory (HBM)**
  - HBM is essential for AI servers, AI accelerators and advanced computing infrastructure
- **Higher resource intensity of HBM**: A typical HBM consumes nearly **2–3 times** more wafer capacity than conventional DRAM.
  - This reduces the availability of conventional memory chips used in mainstream electronics.

- *Wafer capacity* refers to semiconductor manufacturing capacity available for producing chips on silicon wafers.
- AI-oriented chips such as HBM consume more wafer capacity than conventional chips.

How is India affected by the memory chip shortage?

- **Shortage of affordable smartphones:** India is witnessing shortages in **sub ₹10,000 – ₹15,000 smartphone segment** because manufacturers are prioritising premium devices over low-margin entry-level phones.
- **Rising prices:** Memory chip shortages and rising DRAM/NAND prices have reportedly increased prices of several mobile-phone brands.
- **Pressure on entry-level electronics:** The shortage is affecting:
  - Budget smartphones
  - Entry-level laptops
  - Price-sensitive electronics products

Why is India particularly vulnerable?

- **Import dependence:** India heavily depends on imports for:
  - Semiconductor chips
  - Electronic components
  - Advanced memory systems
- **Price-sensitive consumer market:** A large share of India's electronics market depends on affordable smartphones and budget consumer devices.
  - This makes India highly vulnerable to global supply-chain disruptions and semiconductor price volatility.
- **Global allocation bias:** The major chip manufacturers may prioritise premium global brands and higher-margin devices leading to supply constraints for ultra-low-cost smartphone manufacturers.

What are the broader implications of memflation?

Consumer impact

- Higher smartphone prices
- Reduced affordability of entry-level devices
- Delayed device upgrades

Industrial impact

- Increased bill-of-materials (BOM) costs
- Pressure on electronics manufacturing profitability
- Supply-chain uncertainty for device manufacturers

Strategic implications

- Greater concentration of semiconductor power among advanced economies and large technology firms
- Increased vulnerability for import-dependent economies like India

Conclusion:

The ongoing global memory-chip shortage highlights how AI-driven technological shifts can reshape global industrial supply chains. For India, the crisis underscores the strategic importance of building resilient semiconductor and electronics ecosystems to protect affordable digital access, manufacturing competitiveness, and long-term technological security.

Coal Gasification

Context:

The Union government has approved a **₹37,500-crore incentive package** for coal gasification projects.

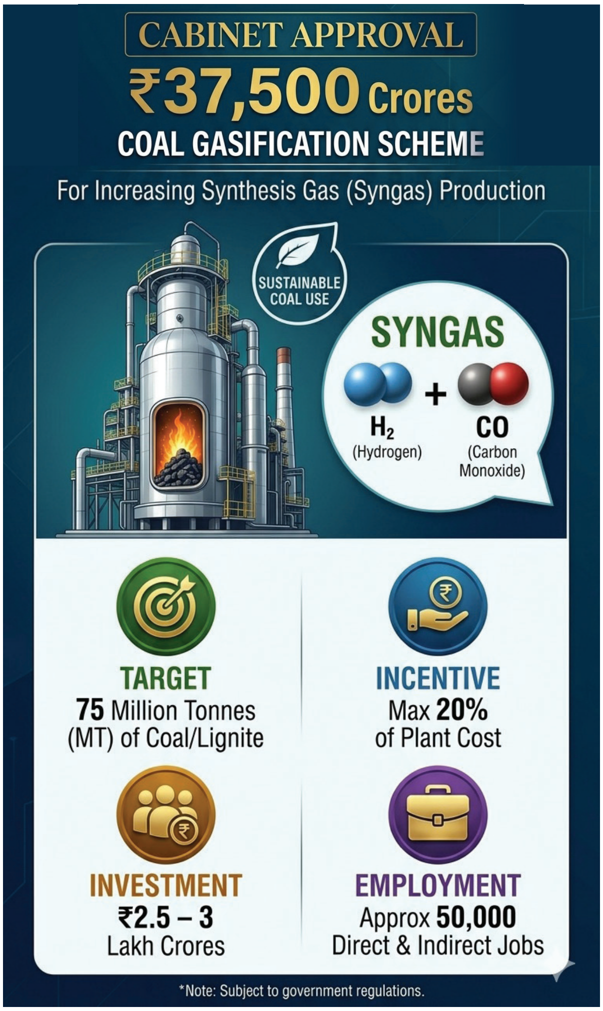
What is Coal Gasification?

- Conversion of coal into **synthetic gas (syngas)** through reaction with oxygen, steam, and controlled heat.
- Syngas (synthetic gas) mainly contains **Carbon Monoxide (CO) and Hydrogen (H_2).**
- It can be used to produce methanol, urea, ammonium nitrate, synthetic natural gas (SNG), hydrogen, ether, dimethyl ether and other industrial chemicals.
- Thus, coal gasification **transforms coal from a fuel for combustion to a feedstock** for chemical and industrial production.

Major Coal Gasification Projects

- Talcher Coal-based Ammonia-Urea Project,
- Coal India joint ventures,
- Projects involving BHEL, GAIL,
- Private sector participation by companies like Jindal Steel and Greta Energy.

**Expected outputs: Syngas, Ammonia, Hydrogen, Ethanol, and Direct Reduced Iron (DRI).*


CABINET APPROVAL

₹37,500 Crores

COAL GASIFICATION SCHEME

For Increasing Synthesis Gas (Syngas) Production

TARGET
75 Million Tonnes (MT) of Coal/Lignite

INCENTIVE
Max 20% of Plant Cost

INVESTMENT
₹2.5 – 3 Lakh Crores

EMPLOYMENT
Approx 50,000 Direct & Indirect Jobs

*Note: Subject to government regulations.

Why is India promoting coal gasification?

- **Reduce Import Dependence:** India imports large quantities of methanol, ammonia, urea, and natural gas.
  - According to the Union Coal Ministry, India imports:
    - Around **one-fifth** of its urea requirement
    - Almost its entire ammonia requirement
    - Nearly **80–90%** of its methanol requirement
  - Coal gasification can substitute some imports in chemicals and fertilisers.
- **Better Utilisation of Domestic Coal:** India has abundant coal reserves, including low-grade and high-ash coal.
  - India possesses approximately:
    - **~401 billion tonnes of coal**
    - **~47 billion tonnes of lignite**
  - The government sees coal gasification as a way to derive higher-value industrial products from domestic coal resources.
- **Energy Security:** Supports diversification of energy sources, and domestic industrial

feedstock production.

  - The Coal Ministry has set a target of **Gasifying 100 million tonnes of coal by 2030.**
  - The recently announced scheme aims to support **gasification of about 75 million tonnes of coal and lignite.**

Why is Indian coal different?

What are the technical challenges in coal gasification?

- **High ash content of Indian coal:**
  - Indian coal has very high ash content which will,
    - Lower calorific value,
    - Create mineral matter complications,
    - Increase processing complexity
    - reduce gasification efficiency
  - This differentiates India from China, Australia, and the U.S. where coal quality differs significantly.
  - This is why **fluidised-bed gasification technology** is considered more suitable for Indian coal.
- **Need for specialised gasifiers:** To process the Indian coal, ordinary gasification systems are unsuitable. It requires,
  - **Fluidised bed gasification technology**
  - **Pressurised fluidised-bed technology**
- **Capital-intensive:** Gasification plants are expensive, and technology-intensive.
- **Technology dependence:** India still depends partly on imported technologies, and advanced equipment.
- **Environmental concerns:** Coal gasification still involves carbon emissions, water use, and pollution management challenges.

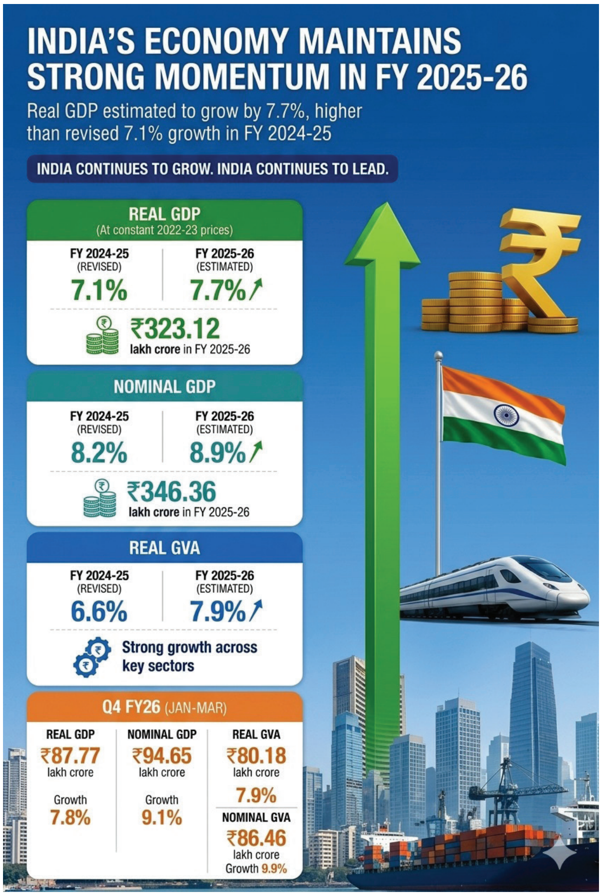
Fluidised-bed gasification

- A technology where coal particles remain suspended in flowing gas during gasification.
- **Advantages:** better mixing, suitable for high-ash Indian coal, and improved heat transfer.
- It handles high-ash coal better.
- **Mechanism:** gas streams lift coal particles away from ash before gasification.

Conclusion:

Coal gasification reflects India's attempt to convert abundant domestic coal reserves into strategic industrial capacity while reducing import dependence in fertilisers, chemicals, and clean fuel alternatives. Its long-term success, however, will depend on India's ability to develop cost-effective indigenous technologies suited to its high-ash coal conditions.

India's GDP Growth



INDIA'S ECONOMY MAINTAINS STRONG MOMENTUM IN FY 2025-26

Real GDP estimated to grow by 7.7%, higher than revised 7.1% growth in FY 2024-25

INDIA CONTINUES TO GROW. INDIA CONTINUES TO LEAD.

REAL GDP
(At constant 2022-23 prices)
FY 2024-25 (REVISED) 7.1%
FY 2025-26 (ESTIMATED) 7.7%
₹323.12 lakh crore in FY 2025-26

NOMINAL GDP
FY 2024-25 (REVISED) 8.2%
FY 2025-26 (ESTIMATED) 8.9%
₹346.36 lakh crore in FY 2025-26

REAL GVA
FY 2024-25 (REVISED) 6.6%
FY 2025-26 (ESTIMATED) 7.9%
Strong growth across key sectors

Q4 FY26 (JAN-MAR)
REAL GDP ₹87.77 lakh crore Growth 7.8%
NOMINAL GDP ₹94.65 lakh crore Growth 9.1%
REAL GVA ₹80.18 lakh crore 7.9%
NOMINAL GVA ₹86.46 lakh crore Growth 9.9%

Context:

India's GDP is estimated to grow by **7.7% in FY 2025-26**, higher than the **7.6% projected earlier** and above the **7.1% growth recorded in FY 2024-25**. Growth in the fourth quarter (Q4) is estimated at **7.8%**.

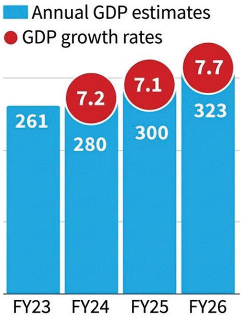
What are the key drivers of growth?

- **Private Consumption Recovery:** Private Final Consumption Expenditure (PFCE) growth accelerated to **7.7%** indicating strengthening household demand.
- **Services Sector Expansion:** The sectors (trade, hotels, transport, communication, broadcasting, and storage services) witnessed strong growth.
  - Growth in this category increased to **11%**.
- **Investment Activity**
  - Growth in Gross Fixed Capital Formation (GFCF) remained strong.
  - Reflects continued asset creation and capital formation.
- **Reform-led Economic Expansion**
  - Improved infrastructure

- Digitalisation
  - Manufacturing incentives
  - Ease of doing business measures
- **Sectoral performance:**
  - **Services Sector:** Fastest-growing component. Growth accelerated significantly in Q4.
  - **Agriculture Sector:** Growth moderated to around **3%**, lower than previous year's performance.
  - **Industry:** Continued contribution through manufacturing and construction activity.

Stronger estimate

India's GDP is estimated to grow by 7.7% in 2025-26, slightly faster than the 7.6% estimated in February 2026. In the chart below, the bars show annual GDP estimates (**in ₹ lakh crore**) and the circles indicate growth rates at constant prices (in %).



ECONOMY
GROWTH

Figures for FY25 and FY26 are First Revised Estimate (FRE) and Provisional Estimate (PE)respectively.

What are the key challenges for FY 2026-27?

- **Global Uncertainty:** Potential risks arise from geopolitical tensions, trade disruptions, and commodity price volatility.
- **Inflationary Pressures:** Persistent price pressures can reduce purchasing power and affect domestic demand.
- **Weak External Demand:** Global economic slowdown may affect exports and manufacturing growth.
- **Agricultural Vulnerability:** Dependence on monsoon performance continues.

Glossary

- **Gross Domestic Product (GDP):** Total monetary value of final goods and services produced within a country during a given period.
- **Private Final Consumption Expenditure (PFCE):** Measures expenditure by households on Goods and Services.
  - Higher PFCE generally indicates stronger domestic demand.
- **Gross Fixed Capital Formation (GFCF):** Measures investment in fixed productive assets (Infrastructure, Machinery, Buildings, and Productive assets)
  - A key indicator of future growth potential.

Foreign Portfolio Investment & G-Sec Market Reforms 2026

Context:

To strengthen India's position as a **leading global investment destination** and to deepen the capital market, the Union government has announced major reforms to:

- Deepen Government Securities (G-Sec) market.
- Increase Foreign Portfolio Investment (FPI) participation.
- Liberalise investment by Persons Resident Outside India (PROIs).
- Rationalise taxation on foreign investments in G-Secs.

Who are Persons Resident Outside India (PROIs)?

A broad category under Foreign Exchange Management Act (FEMA) including **foreign citizens, non-resident entities, Non-Resident Indians (NRIs), and Overseas Citizenship of India (OCIs)** residing outside India.

Why are the reforms needed?

To expand foreign investor base in India which in turn will:

- Increase depth and liquidity of capital markets.
- Diversify investor profile.
- Reduce dependence on volatile short-term capital.
- Attract long-term global institutional investors.

What are those reforms?

- **Liberalised Investment in listed Indian Companies:** To implement the Budget 2026-27 announcement, the Government notified the **Foreign Exchange Management (Non-Debt Instruments) (Third Amendment) Rules, 2026**.
  - **Earlier:** Portfolio Investment Scheme (PIS) was available only to NRI and OCI investors.
    - **Investment limits:** 5% per investor & 10% aggregate ceiling
  - **Now:** Portfolio Investment Scheme extended to all individual PROIs
    - **Revised limits:** 10% per investor & 24% aggregate ceiling
- **Expanded access to G-Secs:** Government made G-Sec investment more attractive by bringing the following securities under **Fully Accessible Route (FAR).**
  - 15-year G-Secs
  - 30-year G-Secs

  - 40-year G-Secs
  - Sovereign Green Bonds (SGrBs)
- **Restrictions removed under general route:**
  - Removed:
    - Short-term investment limit
    - Concentration limit
    - Security-wise limit
  - Retained:
    - 6% ceiling for Central Government Securities
    - 2% ceiling for State Government Securities (SGSs)
  - **Merge of 'General' and 'Long-Term' categories:** To simplify investment rules, reduce compliance burden, and increase flexibility for investors.
- **Tax exemption:**
  - Earlier, interest income and capital gains from G-Secs attracted tax.
  - Now, **FPIs are exempted from interest income tax and Capital gains tax** on Government Securities.
  - Applicable from **1 April 2026**

Fully Accessible Route

- A route under which specified Government Securities can be purchased by non-residents without investment ceilings.
- **Key Feature:** No quantitative restrictions on eligible securities.

Foreign Portfolio Investment (FPI)

- Investment in financial assets without obtaining management control.
- **Examples:** Shares, Bonds, and Government Securities

Government Securities (G-Secs)

- Debt instruments issued by the Government to borrow money.
- **Types:**
  - Treasury Bills (short term)
  - Dated Securities (long term)
  - Sovereign Green Bonds

Bloomberg Global Aggregate Bond Index

Context:

India is pushing for inclusion of its Government Securities (G-Secs) in the **Bloomberg Global Aggregate Bond Index (BGAI)**.

Government Security (G-Sec)

A sovereign debt instrument issued by the Government of India to borrow money.

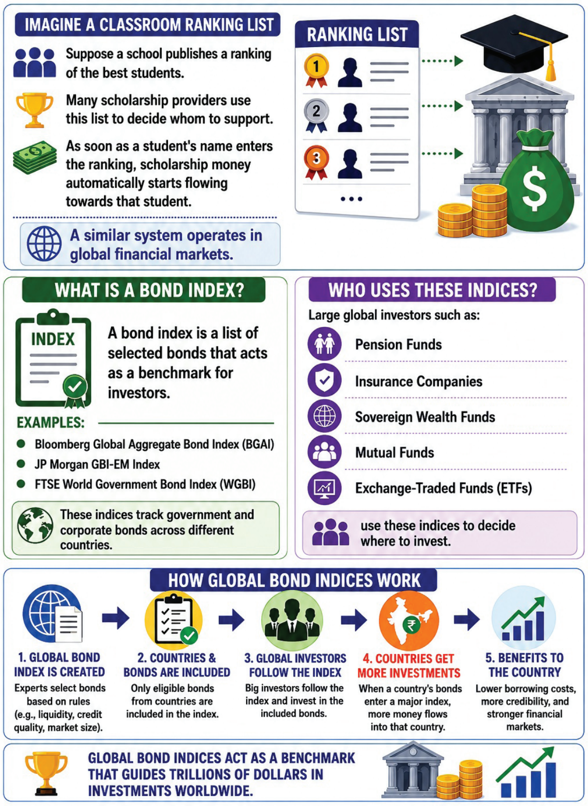
Types:

- Treasury Bills (short-term)
- Dated Securities (long-term)
- Sovereign Green Bonds

What is BGAI?

- A flagship global bond benchmark maintained by Bloomberg Index Services.
- **Key Features**
  - Tracks **investment-grade government and corporate bonds** worldwide.
  - Considered one of the most widely followed global fixed-income indices.
  - Used by:
    - Pension funds
    - Sovereign wealth funds
    - Insurance companies
    - Passive index funds
    - Serves as a benchmark for global bond portfolio allocation.

WHY DO GLOBAL BOND INDICES MATTER?



IMAGINE A CLASSROOM RANKING LIST

Suppose a school publishes a ranking of the best students.

Many scholarship providers use this list to decide whom to support.

As soon as a student's name enters the ranking, scholarship money automatically starts flowing towards that student.

A similar system operates in global financial markets.

WHAT IS A BOND INDEX?

A bond index is a list of selected bonds that acts as a benchmark for investors.

EXAMPLES:

- Bloomberg Global Aggregate Bond Index (BGAI)
- JP Morgan GBI-EM Index
- FTSE World Government Bond Index (WGBI)

These indices track government and corporate bonds across different countries.

WHO USES THESE INDICES?

Large global investors such as:

- Pension Funds
- Insurance Companies
- Sovereign Wealth Funds
- Mutual Funds
- Exchange-Traded Funds (ETFs)

use these indices to decide where to invest.

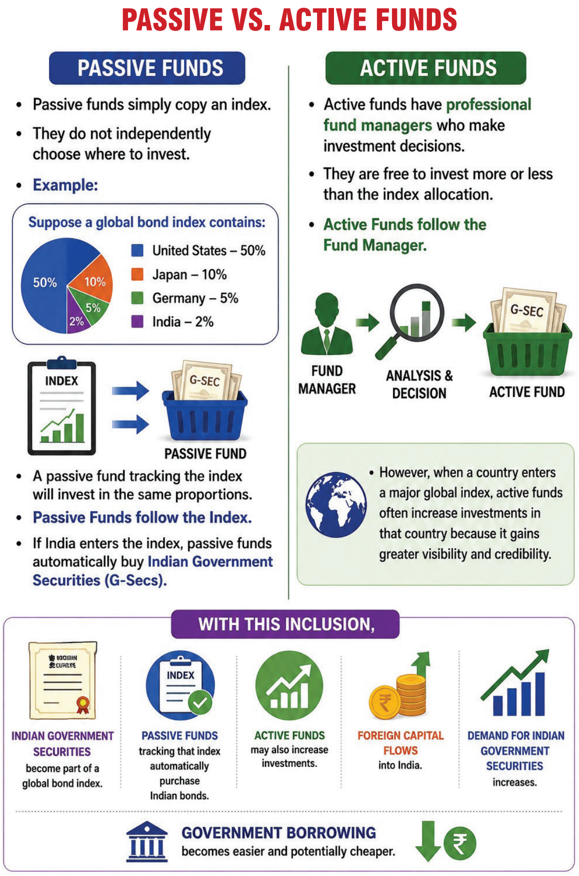
HOW GLOBAL BOND INDICES WORK

1. GLOBAL BOND INDEX IS CREATED: Experts select bonds based on rules (e.g., liquidity, credit quality, market size).
2. COUNTRIES & BONDS ARE INCLUDED: Only eligible bonds from countries are included in the index.
3. GLOBAL INVESTORS FOLLOW THE INDEX: Big investors follow the index and invest in the included bonds.
4. COUNTRIES GET MORE INVESTMENTS: When a country's bonds enter a major index, more money flows into that country.
5. BENEFITS TO THE COUNTRY: Lower borrowing costs, more credibility, and stronger financial markets.

GLOBAL BOND INDICES ACT AS A BENCHMARK THAT GUIDES TRILLIONS OF DOLLARS IN INVESTMENTS WORLDWIDE.

How does this index inclusion bring capital?

- Many global funds invest according to benchmark indices.
- If Indian G-Secs enter the index:
  - o Passive funds automatically allocate money to Indian bonds.
  - o Active funds also increase exposure to avoid benchmark deviation.
  - o Long-term foreign capital inflows increase.



PASSIVE VS. ACTIVE FUNDS

PASSIVE FUNDS

- Passive funds simply copy an index.
- They do not independently choose where to invest.
- **Example:**

Suppose a global bond index contains:

- A passive fund tracking the index will invest in the same proportions.
- **Passive Funds follow the Index.**
- If India enters the index, passive funds automatically buy **Indian Government Securities (G-Secs).**

ACTIVE FUNDS

- Active funds have **professional fund managers** who make investment decisions.
- They are free to invest more or less than the index allocation.
- **Active Funds follow the Fund Manager.**

- However, when a country enters a major global index, active funds often increase investments in that country because it gains greater visibility and credibility.

WITH THIS INCLUSION,

INDIAN GOVERNMENT SECURITIES become part of a global bond index.

PASSIVE FUNDS tracking that index automatically purchase Indian bonds.

ACTIVE FUNDS may also increase investments.

FOREIGN CAPITAL FLOWS into India.

DEMAND FOR INDIAN GOVERNMENT SECURITIES increases.

GOVERNMENT BORROWING becomes easier and potentially cheaper.

What benefits can India gain?

- **Deeper Bond Market**
- o Higher participation by global investors.
- o Greater liquidity in Government Securities.
- **Lower Borrowing Costs**
- o Increased demand for G-Secs can reduce bond yields.
- o Government borrowing becomes cheaper
- **Stable Capital Flows**
- o Attracts pension funds, insurance funds and sovereign wealth funds.
- o Reduces dependence on short-term speculative capital
- **Global Financial Integration**
- o Enhances India's presence in global debt markets.
- o Improves visibility among international investors.

What are the challenges in this process?

- Foreign investors remain sensitive to rupee volatility.
- Sustained inflows depend on macroeconomic stability.
- Operational infrastructure gaps

Floating Solar Energy in India

Context:

The **National Institute of Solar Energy (NISE)**, under the Ministry of New and Renewable Energy (MNRE), has released the first comprehensive assessment of India's **floating solar potential**, estimating that Indian reservoirs can support around **102 GW** of floating solar capacity.

What is Floating Solar?

- Floating Solar Photovoltaic (FSPV) refers to solar panels installed on floating platforms over water bodies such as:
  - o Reservoirs
  - o Dams
  - o Lakes
  - o Irrigation tanks
- Unlike conventional solar parks, floating solar systems utilize water surfaces instead of land.

How did NISE identify suitable reservoirs?

Reservoirs had to meet conditions such as:

- Area greater than 10 hectares
- Water availability for at least 11 months annually
- Water depth between 3–30 metres
- Solar irradiation above 4.5 kWh/m²/day
- Located Within 10 km of roads and substations

National Institute of Solar Energy (NISE)

- Autonomous institute under the Ministry of New and Renewable Energy (MNRE).
- Nodal institution for research, testing, certification and assessment of solar energy technologies in India.

Why is floating solar important?

- **Addresses Land Constraints:**
  - o Conventional ground-mounted solar plants require large tracts of land.
    - ✻ Ground-mounted solar projects require **3–4 times more area/MW** than the actual panel footprint.
    - ✻ Land acquisition is often costly, time-

consuming and prone to conflicts with agriculture and habitation.

  - Floating solar is therefore considered a **"land-neutral"** renewable energy option because it utilizes existing water surfaces instead of acquiring additional land.
- **Supports India's renewable energy targets:**
  - India aims to achieve **500 GW of non-fossil fuel capacity by 2030**
  - Floating solar can:
    - Expand renewable capacity without additional land pressure.
    - Utilize underused reservoir surfaces.
    - Complement existing hydropower infrastructure.

India's Floating Solar Potential

- NISE identified potential after applying multiple geospatial filters.

Key findings:

- Feasible reservoir area identified: **1,946 sq. km**
- Reservoir surface utilization cap assumed: **20%**
- Estimated floating solar potential: **102.18 GW**

CLEAN ENERGY
SUSTAINABLE INDIA
BRIGHTER FUTURE

Which states have the largest floating solar potential?

State	Estimated Potential
Maharashtra	16.28 GW
Madhya Pradesh	14.89 GW
Karnataka	13.69 GW
Odisha	12.81 GW
Telangana	10.72 GW

What are the challenges in scaling up floating solar?

- **Higher costs:** According to the report, floating solar systems cost about **25% more upfront** than ground-mounted systems. Additional costs arise from:
  - Floating platforms
  - Anchoring systems
  - Waterproofing
  - Specialized engineering requirements
- **Operational challenges:**
  - Field observations at projects have reported:
    - Loosening of floating joints
    - Platform misalignment
    - Uneven buoyancy
    - Electric cable damage
  - These affect long-term reliability and maintenance.
- **Lack of detailed cost assessment:**
  - The NISE study focuses on technical potential and does not estimate:
    - Project economics.
    - Cost competitiveness.
    - Financial viability at scale.
  - Thus, technical feasibility does not automatically translate into commercial viability.
- **Emerging technology ecosystem:** Globally, floating solar capacity reached approximately **9.6 GW in 2024**, indicating that the technology remains at a relatively early stage of deployment compared to conventional solar.
  - Nearly **90%** of installed capacity is located in Asia.
  - China hosts some of the world's largest floating solar installations.

INDIA'S FLAGSHIP FLOATING SOLAR PROJECT

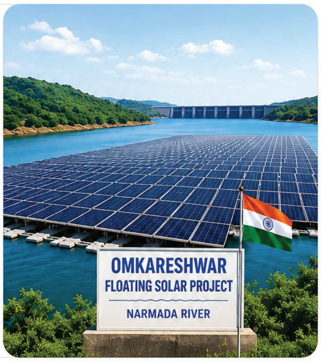
OMKARESHWAR FLOATING SOLAR PROJECT

Located on the **Narmada River** in Madhya Pradesh.

Present capacity: **278 MW**

Planned expansion: **600 MW**

Currently India's largest **floating solar project.**



Conclusion:

India's renewable energy transition increasingly faces a **land-energy conflict**. Floating solar offers a way to expand renewable capacity without competing for agricultural land, forests, or habitation areas. If successfully integrated with existing water and power infrastructure, floating solar can become a significant pillar of India's clean energy transition.

Foreign Currency Non-Resident (Bank) [FCNR(B)] deposits

Context:

Recently, the RBI announced special measures to encourage inflows through Foreign Currency Non-Resident (Bank) [FCNR(B)] deposits. Under the scheme, the government/RBI will bear hedging costs for fresh FCNR(B) deposits of 3–5 years up to September 2026, making these deposits more attractive for NRIs.

What are FCNR(B) Deposits?

- A fixed deposit account that allows NRIs to keep money in designated foreign currencies with Indian banks.
- The deposit remains in foreign currency and is protected from exchange-rate fluctuations during the deposit period.
- **Eligible investors:**
    - Non-Resident Indians (NRIs)
    - Overseas Citizens of India (OCIs)
    - Persons of Indian Origin (PIOs)
- **Permitted Currencies:**
    - US Dollar (USD)
    - Pound Sterling (GBP)
    - Euro (EUR)
    - Japanese Yen (JPY)
    - Canadian Dollar (CAD)
    - Australian Dollar (AUD)

How is FCNR different from NRE Deposits?

Feature	FCNR(B)	Non-Resident External (NRE) Deposit
Currency maintained in	Foreign Currency	Indian Rupees
Exchange-rate risk	No	Yes
Repatriation	Fully repatriable (Funds can be freely transferred back to the country of residence without restrictions.)	Fully repatriable
Interest income	Tax-free in India (subject to applicable rules)	Tax-free in India (subject to applicable rules)
Main purpose	Preserve foreign currency value	Hold overseas earnings in rupees

Why do NRIs prefer FCNR Deposits?

- **Protection from Currency Risk:**
    - If an NRI deposits USD 10,000:
        - In an FCNR account → money remains in dollars.
        - In an NRE account → dollars are converted into rupees.
    - If the rupee depreciates later, the FCNR depositor is protected from conversion losses.
- **Tax advantage:** Interest earned on FCNR deposits is generally exempt from Indian income tax for eligible non-residents.
- **Assured returns:** Fixed interest rates provide predictable returns.

How does Hedging Work here?

- **Hedging** is a mechanism used to protect against future losses arising from exchange-rate movements.

Let's understand through an example:

- Suppose an NRI deposits **$10,000** in an FCNR deposit for 5 years
- The bank now owes the NRI:
    - Principal = $10,000
    - Plus interest in dollars
- The liability of the bank is in **US dollars**, not in rupees. But banks mainly lend and operate in **Indian rupees**. This creates a currency risk.
- **Today,** $1 = ₹85. NRI deposits $10,000
        - The bank receives $10,000 = ₹8.5 lakh. Banks may use this money in India.
    - **After 5 years,** Suppose the rupee weakens. $1 = ₹100. Now bank must return $10,000
        - To buy those dollars, it needs ₹10 lakh
        - But originally it received only ₹8.5 lakh
        - Loss due to exchange rate movement ₹1.5 lakh
        - This is currency risk.
- Through hedging, the bank enters into a contract today itself. It tells another financial institution:
    - "Five years later, I will need $10,000. Please guarantee that I can buy dollars at a pre-agreed exchange rate."
    - Thus the future exchange rate is locked today. Whether the dollar becomes ₹100, ₹110 or ₹120, the bank remains protected.
- The institution providing protection charges a fee. This is called the **hedging cost**.
    - **Normally:** NRI → Bank → Bank bears hedging cost
    - **Now:** NRI → Bank → RBI bears hedging cost
    - Since RBI bears hedging costs, the bank's cost reduces. Therefore, banks provide higher interest rates to NRIs which will increase foreign funding to India.

Why does FCNR matter for the Indian economy?

- **Supports Forex Reserves:** Brings foreign currency into India.
- **Supports Rupee Stability:** Higher dollar inflows reduce pressure on the rupee.
- **Strengthens External Sector:** Provides a non-debt source of foreign currency funding.
- **Helps Banks Raise Overseas Resources:** Banks gain access to foreign currency funds at competitive costs.

Dropshipping

Context:

With the rapid expansion of e-commerce and social media marketing, **dropshipping** has emerged as a popular low-cost online business model. As it lowers entry barriers for entrepreneurs, it also raises concerns regarding consumer protection, product quality, accountability, and supply-chain transparency.

What is Dropshipping?

- An **e-commerce business model** in which:
    - Seller accepts customer orders.
    - Seller **does not own or store inventory.**
    - Order details are forwarded to a manufacturer/wholesaler/supplier.
    - Supplier ships products directly to the customer.
- **Flow:** Customer → Online Seller (Dropshipper) → Supplier/Manufacturer → Customer
- The seller acts as an intermediary/middleman and earns through **price margins** (difference between selling price and procurement cost).
- **Legality:** Dropshipping is generally **legal** in most countries **provided that businesses comply with consumer protection laws, taxation rules, import regulations, and platform policies**.
- **E.g.:** Amazon (allows certain third-party sellers to use dropshipping arrangements under its policies)

Examples of Dropshippers

Instagram Gadget Store

- A person creates an Instagram page selling wireless earbuds for ₹1,499.
- The actual supplier in China sells them for ₹700.
- When a customer orders, the seller forwards the order to the supplier.
- The supplier ships directly to the customer.
- Profit for the dropshipper = ₹799 (minus advertising and transaction costs).

Shopify-based Online Store

- An entrepreneur creates a store on Shopify selling fitness accessories.
- Products are sourced from suppliers through platforms like AliExpress.
- Orders received on the website are automatically sent to suppliers.
- The supplier packs and ships the products.

WhatsApp Fashion Seller

- A seller advertises handbags and clothing through WhatsApp groups.
- Products are actually stocked by wholesalers in another city.
- Once payment is received, the wholesaler dispatches the product directly to the customer.

Print-on-Demand Business (Variant of Dropshipping)

- A seller designs custom T-shirts and lists them online.
- A third-party company prints and ships the T-shirt only after an order is placed.
- The seller never handles inventory.

How is it beneficial?

To entrepreneurs:

- Low investment.
- No inventory management.
- Easy entry into e-commerce.
- Ability to test new products quickly.

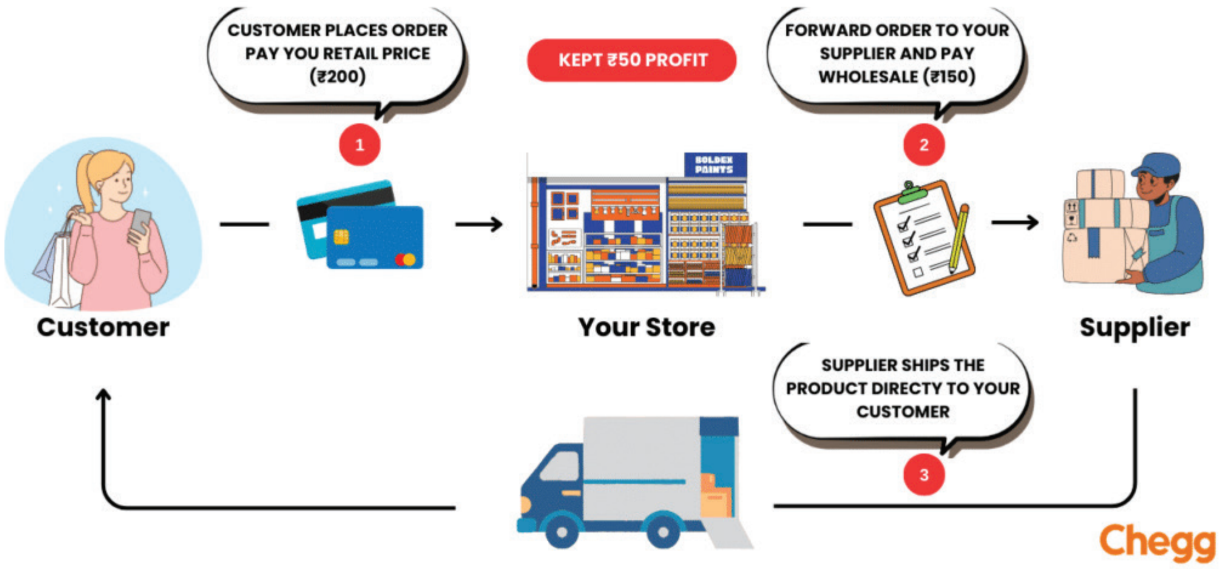
To customers:

- Access to a wide variety of products.
- Availability of foreign or niche products that may not be locally stocked.

What makes it risky for online shoppers?

- **Lack of Transparency:** Customers often believe they are buying from the original seller, while the seller is only an intermediary.
- **Product Quality Issues:** Counterfeit products, Poor-quality goods, Defective or rejected items.
- **Difficulty in Verifying Sellers:** Many dropshippers operate through social media accounts with limited information about their identity or suppliers.
- **Delayed Deliveries:** Products may be shipped from foreign suppliers, leading to long waiting periods.
- **Refund and Complaint Problems:** When issues arise, responsibility may be unclear between the dropshipper and the actual supplier.
- **Data Privacy Risks:** Customer information may be shared across multiple parties in the supply chain without clear consent.
- **Legal and Regulatory Concerns:** Cross-border transactions may violate import, consumer protection, or taxation rules if not properly managed.

Dropshipping Business Model


CUSTOMER PLACES ORDER PAY YOU RETAIL PRICE (₹200)
KEPT ₹50 PROFIT
FORWARD ORDER TO YOUR SUPPLIER AND PAY WHOLESALE (₹150)
1
2
Customer
Your Store
Supplier
SUPPLIER SHIPS THE PRODUCT DIRECTY TO YOUR CUSTOMER
3
Chegg

How is Dropshipping Different from Conventional E-Commerce?

Feature	Conventional E-Commerce	Dropshipping
Inventory ownership	Seller owns inventory	Seller owns no inventory
Warehousing	Required	Not required
Shipping	Seller ships products	Supplier ships products
Capital requirement	Higher	Lower
Quality control	Greater control	Limited control
Accountability	More direct	Often diffused

Conclusion:

As digital commerce evolves, dropshipping demonstrates how technology can democratise entrepreneurship and expand market access. The challenge ahead is to build a framework where innovation, consumer trust, supply-chain transparency, and digital accountability grow together, ensuring that the future of e-commerce remains both inclusive and secure.

India's Merchandise Exports

Context:

India's **merchandise exports touched an all-time high of USD 45.2 billion in May 2026**. Despite strong export growth, the overall trade deficit widened.

What are Merchandise exports?

- Export of **physical goods** from a country to the rest of the world.
- **Examples:** Engineering goods, Electronics, Chemicals, Textiles, Gems & jewellery, and Petroleum products.

What sectors drove India's export growth?

- **Engineering Goods:** Exports rose by **24.5%** and reached **USD 12.3 billion**
- **Electronics:** Exports increased by **11.6%** reaching **USD 5.1 billion**
- **Chemicals:** Organic and inorganic chemicals exports rose by **12.7%** to **USD 2.7 billion**
- **Gems & Jewellery:** Exports increased by **6.7%** to **USD 2.5 billion**
- **Non-Petroleum Exports:** Grew by **10.5%**
- Reached **USD 70.7 billion** in the first two months of FY 2026-27

Why did the trade deficit widen despite record exports?

- Because imports grew faster than exports.
    - Merchandise imports increased **22.1%**
    - Reached **USD 73.4 billion**
    - Services imports rose **14.1%**
    - Reached **USD 19.1 billion**
- Thus, import growth outpaced export growth, widening the trade gap.

Trade Deficit

A trade deficit occurs when **Imports > Exports**. It indicates that a country is purchasing more goods/services from abroad than it is selling.

Development Policy Financing

Context:

The World Bank approved **US$1.5 billion** under its **Development Policy Financing (DPF)** operation to support India's structural reforms aimed at boosting private-sector-led growth and job creation. This move is aligned with **Country Partnership Framework FY26–31.**

About World Bank

- The **World Bank** is a **multilateral development institution** established in **1944** under the **Bretton Woods Agreement**.
- It provides financial and technical assistance to developing countries to reduce poverty, promote sustainable development, and strengthen institutions.
- It comprises 5 institutions:
  - **IBRD** (International Bank for Reconstruction and Development) provides loans to middle-income and creditworthy lower-middle-income countries.
  - **IDA** (International Development Association) provides concessional loans and grants to the world's poorest countries.
  - **IFC** (International Finance Corporation) supports private sector development through investments and advisory services.
  - **MIGA** (Multilateral Investment Guarantee Agency) provides political risk insurance to encourage foreign investment.
  - **ICSID** (International Centre for Settlement of Investment Disputes) facilitates arbitration and settlement of international investment disputes.

Why do countries borrow from multilateral institutions?

To:

- finance infrastructure
- support social programmes
- undertake structural reforms
- respond to crises
- access long-term financing at relatively favourable terms

- A ***Country Partnership Framework (CPF)*** is a medium-term strategic roadmap that outlines how the **World Bank Group** will support a country's development priorities through financing, technical assistance, and policy reforms.
- **India's current CPF (FY2026 FY2031)** focuses on creating jobs, strengthening human capital, building climate resilience, and promoting private sector-led growth in line with the **Viksit Bharat@2047** vision.

What is Development Policy Financing (DPF)?

- A World Bank lending instrument that provides **budgetary support** to governments for implementing **policy and institutional reforms**, rather than financing specific infrastructure projects.
- **Key features:**
  - Provides funds directly to the government's budget.
  - Linked to **prior policy actions and reforms** agreed upon with the World Bank.
  - Supports macroeconomic stability, governance, and structural reforms.
  - Disbursed after the agreed reforms are implemented.
  - Primarily financed through the World Bank's **International Bank for Reconstruction and Development (IBRD)** for middle-income countries such as India.

How is it different from project financing?

Development Policy Financing (DPF)	Investment Project Financing (IPF)
Supports policy and institutional reforms	Finances specific infrastructure or development projects
Funds flow to the government budget	Funds are tied to identified projects
Linked to policy actions	Linked to project implementation and outputs
Focuses on governance and structural reforms	Focuses on physical assets and service delivery

What reforms does this DPF support?

- **Improving business environment** with tax simplification, regulatory reforms, and ease of doing business
- **Trade & investment openness**
  - Trade facilitation
  - Investment reforms
  - Lower regulatory barriers
- **Mobilising private capital** through entrepreneurship, private investment, and job creation
- With this, India will see **around 11 million youth entering the labour market annually** over the next two decades.

Why is it significant?

- Supports India's structural reform agenda without prescribing individual projects.
- Encourages private sector-led employment generation.
- Helps improve the investment climate and productivity.
- Strengthens long-term economic growth through institutional reforms rather than capital expenditure alone.

Conclusion:

Development Policy Financing marks a shift from funding projects to financing reforms. Its success ultimately depends not on loan size, but on India's ability to convert policy reforms into investment, productivity, and quality employment.

Science & Technology

Zwan-Wolf Effect

Context:

Recently NASA's MAVEN spacecraft has detected evidence of the **Zwan–Wolf effect at Mars.**

What is the Zwan–Wolf effect?

- A magnetic-plasma interaction caused by solar wind near a planet's magnetic boundaries.
- **How does it occur?**
  - Solar wind consists of charged particles flowing outward from the Sun.
  - As solar wind approaches a planet's magnetic field:
    - The particles become compressed near magnetic boundaries.
    - This creates a pressure gradient.
    - Charged particles are pushed along magnetic field lines and diverted away from the main stream.
- **Result:**
  - Regions near the stream experience lower particle density.
  - This particle-depleted region is known as the Zwan–Wolf effect.

MAVEN is a NASA mission studying:

- The Martian atmosphere
- Solar wind interaction with Mars
- Atmospheric loss processes on the planet

What is the scientific significance of this finding?

- Mars **does not possess a strong global magnetic field** like Earth and is often described as an **"unmagnetised"** planet.
- The findings show that:
  - Even planets without strong planetary magnetism can exhibit complex magnetic-plasma interactions.
  - Localised magnetic structures can still influence solar-wind behaviour.

Conclusion:

The discovery of the Zwan–Wolf effect at Mars improves understanding of solar-wind interactions, planetary magnetic environments, and atmospheric evolution. It also expands scientific understanding of how even weakly magnetised planets respond to space-weather events.

Clathrate Crystal Discovery

Context:

Scientists have discovered a rare crystal structure called a **clathrate** inside *trinitite*.

What is Trinite?

- The **green glass** formed when the intense heat of the Trinity nuclear blast melted desert sand and surrounding materials after the **first nuclear explosion during the 1945 Trinity test** in New Mexico.
- The explosion generated **extremely high temperatures and pressures**, creating unusual mineral structures.

- *Clathrates* are cage-like crystal structures where atoms form tiny cages trapping other atoms inside.
- In this case, silicon atoms formed cage structures containing calcium and copper atoms.

What is the significance of this discovery?

- **First Observation in Nuclear Blast Debris:** This is the first time a clathrate has been identified among solid products of a nuclear explosion.
- **Extreme Condition Formation:** The crystal likely formed under extreme conditions of:
  - Very high temperatures
  - Rapid cooling
  - Gigapascal-level pressures
- **Scientific Significance:** Shows how extreme environments can create materials not easily produced in normal laboratories.
  - Helps scientists understand matter formation under high-energy conditions.
- **Material Science Applications:** Clathrates are studied for:
  - Thermoelectric materials
  - Semiconductor applications
  - Advanced energy materials

AI Information Agents

Context:

Google announced AI-powered **"information agents"** capable of continuously browsing and monitoring the web on behalf of users reflecting the transition from passive search engines to proactive AI-driven digital ecosystems.

What are AI Information Agents?

- **Autonomous software systems** that continuously collect, monitor, filter, analyse, and act upon information from digital platforms on behalf of users.
- They use Artificial Intelligence, Large Language Models (LLMs), automation tools, and user data integration.
- **Key features:**
  - Tracks information automatically (**Continuous Monitoring**)
  - Acts without constant human input (**Autonomous Operation**)
  - Uses information from multiple apps/services
  - Learns user preferences (**Personalisation**)
  - Can trigger tasks or recommendations
  - Uses LLMs and predictive systems
- Large Language Models (LLMs) are AI systems trained on massive datasets to understand and generate human-like text.

How are they different from search engines?

Search Engine	AI Information Agent
User actively searches	AI continuously monitors
Reactive system	Proactive system
Session-based interaction	Persistent interaction
Provides links/results	Analyses and acts on information
Limited personalisation	Deep behavioural profiling
Lower automation	Autonomous task execution

What are the concerns associated?

- **Privacy concerns:** These agents may collect financial information, location data, behavioural patterns, browsing history, and personal preferences.
- **Platform concentration/Data Monopoly:** Large

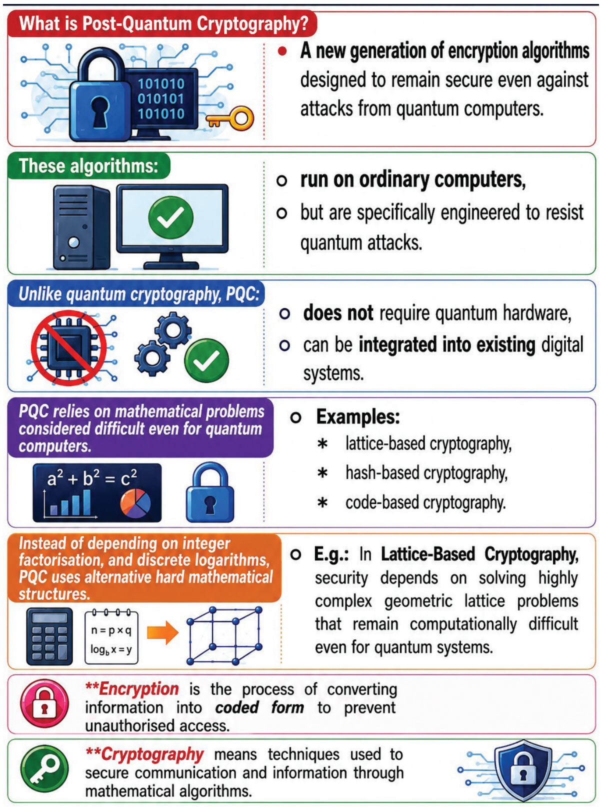
technology companies gain more user data, stronger market control, and greater influence over digital ecosystems.

- **Automated web traffic:** AI agents may continuously crawl websites, increasing bot traffic, server load, and digital infrastructure stress. (This can affect publishers, websites and internet efficiency).
- **Ethical concerns:** manipulation, algorithmic bias (Systematic errors in AI systems leading to unfair outcomes), opaque decision-making, profiling, and behavioural influence.
- **Digital divide:** Advanced AI assistants may become available mainly to premium users, widening technological inequality, and information asymmetry.

Post-Quantum Cryptography

Context:

A task force constituted by the Department of Science & Technology (DST) recommended that **India's Critical Information Infrastructure (CII) Sectors** begin transitioning towards **Post-Quantum Cryptography (PQC)**, warning that future quantum computers may compromise existing encryption systems protecting sensitive data and digital infrastructure.



What is Post-Quantum Cryptography?

- **A new generation of encryption algorithms** designed to remain secure even against attacks from quantum computers.

These algorithms:

- **run on ordinary computers,**
- but are specifically engineered to resist quantum attacks.

Unlike quantum cryptography, PQC:

- **does not** require quantum hardware,
- can be **integrated into existing** digital systems.

PQC relies on mathematical problems considered difficult even for quantum computers.

- **Examples:**
    - lattice-based cryptography,
    - hash-based cryptography,
    - code-based cryptography.

Instead of depending on integer factorisation, and discrete logarithms, PQC uses alternative hard mathematical structures.

- **E.g.:** In **Lattice-Based Cryptography,** security depends on solving highly complex geometric lattice problems that remain computationally difficult even for quantum systems.

Encryption* is the process of converting information into ***coded form to prevent unauthorised access.

***Cryptography* means techniques used to secure communication and information through mathematical algorithms.

Why are Quantum Computers a threat to existing encryption?

- Most present-day digital systems rely on **public-key cryptography** and **mathematical problems difficult for classical computers** to secure:
    - Banking transactions
    - Government communications
    - Telecom networks
    - Defence systems
    - Digital identity platforms
    - **Examples:** RSA encryption, Elliptic Curve Cryptography (ECC).
- Quantum computers use **principles of quantum mechanics** (superposition, entanglement, quantum parallelism).
- They can **theoretically solve certain computational problems much faster** than classical binary-based computers.
    - They process information using qubits instead of classical bits (either 0 or 1).
    - Quantum bit (qubit) can exist in multiple states simultaneously.
    - This enables quantum algorithms such as **Shor's Algorithm**, which can efficiently crack public-key cryptographic systems.
- This creates a possibility that future quantum computers may eventually:
    - break existing public-key encryption systems,
    - compromise digital security,
    - expose confidential data.
    - erode trust in digital governance,
    - Increase cyber security risks,
    - expose critical infrastructure.
- This can be addressed through **Quantum-safe encryption** where the cryptographic systems are capable of resisting attacks from quantum computers.
- It includes PQC algorithms, and quantum-resistant security protocols.

Public-Key Cryptography is a cryptographic system using a public key for encryption, and a private key for decryption.

What is India's current institutional response to this?

- **DST Task Force:** The task force was constituted under the Department of Science & Technology (DST).
    - It is chaired by Rajkumar Upadhyay (C-DOT)
    - Co-chaired by Manindra Agrawal (IIT Kanpur)

- **National Quantum Mission (NQM):** Approved in April, 2023
  - **Key features:**
    - Outlay of ₹6,003.65 crore
    - Mission period up to 2030–31
    - **Focus areas:** Quantum computing, Quantum communication, Quantum sensing, Quantum materials
  - The mission operates through thematic hubs at IISc and IITs.

Migration roadmap suggested by the task force

- The report identified sectors such as **government, defence, telecom, power, transport, banking and finance** for phased migration to PQC.
- The report recommends a **phased transition** strategy.
- **Critical Information Infrastructure (CII) sectors:** Accelerated migration timeline:
  - Foundation phase by 2027
  - Migration of high-priority systems by 2028
  - Full PQC adoption by 2029
- **Other enterprises:** A relatively slower migration schedule has been suggested.

FemTech Platforms

Context:

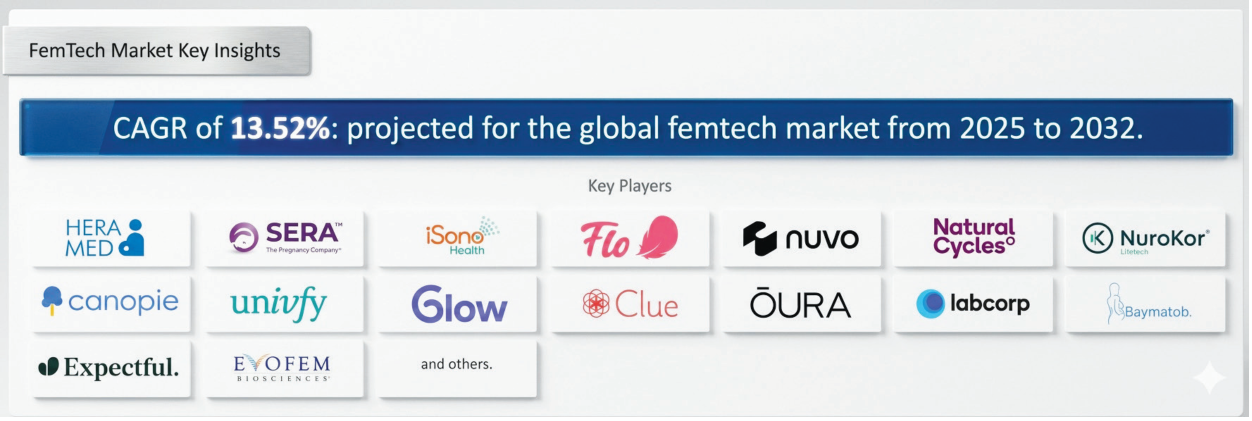
The global renaming of **Polycystic Ovary Syndrome (PCOS) as Polycystic Ovarian Metabolic Syndrome (PMOS)** has highlighted major gaps in conventional women's healthcare, creating space for FemTech platforms offering integrated and long-term care solutions in women's healthcare systems.

What are FemTech Platforms?

- FemTech = Female Technology
- It refers to **digital platforms and technology-enabled products, healthcare services** designed specifically for women's health needs.
- It combines telemedicine, AI, wearables, diagnostics, digital consultations, health tracking, integrated specialist care, wellness support, counselling services, and personalised care solutions.
- **Major Areas of FemTech:**
  - Menstrual health
  - Fertility and reproductive health
  - Pregnancy and maternal care
  - Menopause management
  - Gynaecological disorders
  - Mental health and wellness
  - Hormonal and metabolic disorders such as PMOS

Why is FemTech gaining importance in India?

- **Large unmet healthcare demand:** Women's healthcare often remains fragmented, urban-centric, and reproductive-focused.
  - Many conditions such as PMOS require coordinated long-term management.
- **Breaking social barriers:** FemTech provides privacy, convenience, reduced stigma, and easier access to specialists.
  - This is particularly important for reproductive and gynaecological consultations.
- **Rapid market growth:** India's FemTech market was estimated at **~$1.48 billion** in 2025 and is projected to expand significantly over the next decade.
- **Structural gaps in women's healthcare:** Shortage of gynaecologists, especially in rural India, overcrowded hospitals, high patient loads, and limited counselling support left little room for holistic women's healthcare.
- **Fertility centric understanding of women's health:**
  - **E.g.:** Hormonal and metabolic symptoms may **remain undiagnosed for years,** delaying treatment. In many social settings, PMOS is viewed mainly through marriage prospects, infertility concerns, and weight loss pressures.



FemTech Market Key Insights

CAGR of **13.52%**: projected for the global femtech market from 2025 to 2032.

Key Players

HERA MED, SERA The Pregnancy Company, iSono Health, Flo, nuvo, Natural Cycles, NuroKor Litetech, canopie, univfy, Glow, Clue, ŌURA, labcorp, Baymatob, Expectful., EVOFEM BIOSCIENCES, and others.

How do FemTech Platforms Operate?

- **Integrated Care Model:** FemTech platforms attempt to provide coordinated multidisciplinary care by integrating general practitioners, gynaecologists, endocrinologists, dermatologists, nutritionists, psychologists, and fitness experts.
    - This shifts women's healthcare away from fragmented treatment toward **continuous care management**.
- **Digital and Coordinated Care:** FemTech platforms use teleconsultations, digital health tracking, personalised care plans, wellness monitoring and long-term follow-up systems to improve continuity and patient engagement.
- **Improving doctor-patient interaction:** Several platforms attempt to improve doctor-patient interaction by encouraging more inclusive and less prejudiced communication around:
    - Marital status
    - Fertility
    - Body weight
    - Reproductive health

What are the limitations of FemTech Platforms?

Structural limitations:

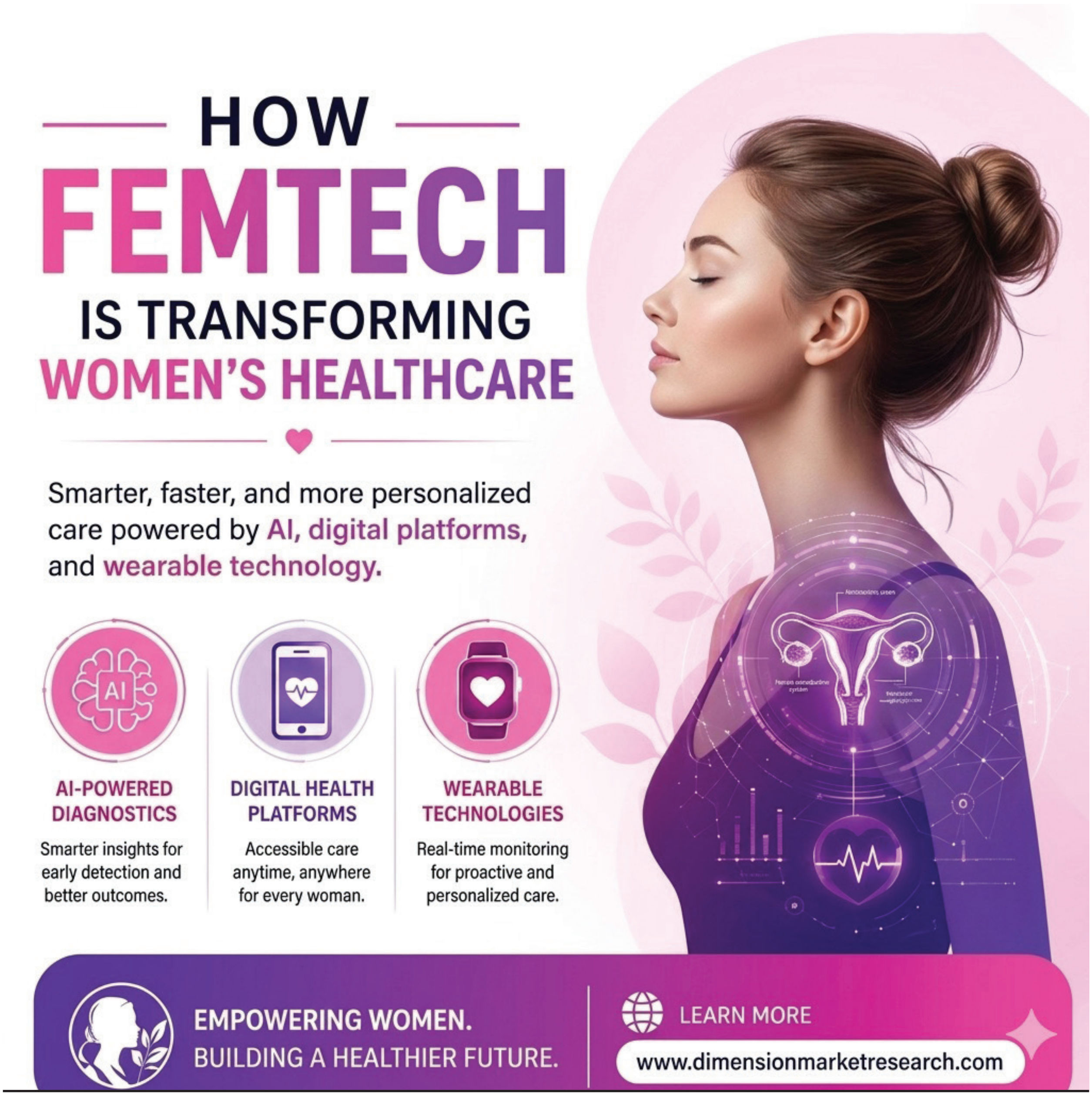
- **Digital divide:** Benefits remain concentrated among urban women, smartphone users, and digitally literate populations.
    - Rural and poorer women may remain excluded.
- **Weak regulation of health-data privacy:** FemTech applications collect highly sensitive health information.
    - Research highlights concerns regarding data privacy, third-party data sharing, security vulnerabilities, and protection of reproductive health information.
- **Cannot substitute public healthcare:** FemTech can coordinate care but cannot replace:
    - Public health infrastructure (public hospitals)
    - Trained specialists
    - Community healthcare systems
    - Broader medical infrastructure
    - Affordable healthcare access

Market vulnerabilities:

- **Venture capital dependence:** FemTech start-ups remain highly dependent on venture capital.
    - Indian FemTech funding has witnessed a significant slowdown after earlier growth phases, leading to consolidation within the sector.
- **Neglect of environmental and lifestyle determinants:**
    - FemTech discussions often inadequately engage with broader structural contributors to women's health problems such as:
        - adulterated food,
        - pollution,
        - chronic stress,
        - sedentary lifestyles,
        - environmental toxins
    - This risks over-medicalising women's health without addressing underlying social and environmental determinants.

Conclusion:

The rise of FemTech platforms reflects both innovation and institutional gaps in women's healthcare. While these platforms have improved access, coordination, and privacy in PMOS care, sustainable progress will require stronger public health systems, inclusive medical practice, and a broader understanding of women's health as a long-term structural issue rather than merely a reproductive concern.



HOW

FEMTECH

IS TRANSFORMING

WOMEN'S HEALTHCARE

Smarter, faster, and more personalized care powered by AI, digital platforms, and wearable technology.

AI-POWERED DIAGNOSTICS

Smarter insights for early detection and better outcomes.

DIGITAL HEALTH PLATFORMS

Accessible care anytime, anywhere for every woman.

WEARABLE TECHNOLOGIES

Real-time monitoring for proactive and personalized care.

EMPOWERING WOMEN.
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India's Semiconductor Ecosystem

Context:

NITI Aayog released its Frontier Tech Hub report titled **"Future of India's Semiconductor Industry"** which assessed **how India should realistically build semiconductor capabilities.**

What messages did the report give?

- **India still lacks a complete semiconductor manufacturing ecosystem** and remains import-dependent.
- Despite these challenges, semiconductor capability is strategically essential and must be pursued through long-term state support.

Why does India need a semiconductor ecosystem?

- **Economic significance:** Semiconductors are critical inputs for nearly all modern electronic products and industrial systems.
- **Technological sovereignty:** Control over semiconductor supply chains determines a country's technological competitiveness and innovation capacity.
- **National security:** Defence platforms, aerospace systems, communication networks and critical infrastructure increasingly depend on advanced semiconductor components.
- **Supply-chain resilience:** Geopolitical disruptions can severely affect access to chips and electronic components.

Current Status of India's Semiconductor Efforts

- India currently does not have an operational semiconductor fabrication (fab) facility.
- The **first semiconductor fab** is expected to become operational in **Dholera, Gujarat by 2028.**
- Around ten semiconductor projects are currently at various stages of development.
- Several packaging and testing facilities have already been approved.

India's Semiconductor Mission (ISM)

- Launched to develop a domestic semiconductor ecosystem.
- Corpus: ₹76,000 crore.
- Supports semiconductor fabrication, packaging, testing, design and related infrastructure.

What are the major challenges before India's semiconductor industry?

- **Absence of fabrication capacity:** Despite policy support, India remains dependent on imports for most semiconductor requirements.
  - Even chips used in electronics assembled domestically are largely sourced from abroad.
- **Long gestation period:**
  - Semiconductor fabs require,
    - 4–5 years before production begins.
    - Large investments in specialised equipment.
    - Significant time for yield optimisation and commercial viability.
  - This makes semiconductor manufacturing a long-term strategic investment.
- **Dependence on global supply chains:** A single fab may require procurement of more than 50 specialised equipment categories from global suppliers. This creates vulnerabilities in:
  - Equipment access
  - Technology transfers
  - Supply-chain disruptions
- **Talent and skill gaps:** Developing a skilled semiconductor workforce requires substantial investments in:
  - Chip design
  - Materials science
  - Process engineering
  - Advanced manufacturing
- **High capital requirements:** The NITI Aayog report estimates that India may require **$45–60 billion** in capital expenditure over the next decade to build a globally competitive semiconductor ecosystem.
- **Geopolitical vulnerabilities:** Events such as tensions in Taiwan can disrupt global semiconductor supply chains.
- **Dependence on imported chips also raises concerns for** defence production, aerospace systems, and strategic technologies.

Trusted Partners for Semiconductor Cooperation

- United States
- Japan
- European Union
- South Korea

Areas of cooperation:

- Critical tools and equipment
- Technology access
- Lifecycle support
- Advanced manufacturing ecosystems

Which areas should India prioritise?

According to the NITI Aayog Report, :

- **Semiconductor packaging and testing:**
  - It is less capital-intensive than fabrication.
  - It occupies a critical position in the semiconductor value chain.
  - India can achieve rapid import substitution in high-volume domestic segments.
- **Semiconductor design:** India already possesses a strong engineering talent base and significant presence in global chip design services.
- **Research and Development:** India should focus on building:
  - Sovereign design capabilities
  - Materials science expertise
  - Advanced silicon engineering
  - AI-assisted semiconductor engineering
- **Compound semiconductors and mature nodes:** India should focus on strategically relevant technologies rather than only chasing frontier 3–7 nanometre fabrication.

Conclusion:

Semiconductor sovereignty **does not mean complete self-sufficiency**. Instead, India should pursue selective domestic capability, strategic partnerships, indigenous design strength, packaging leadership, and long-term industrial policy.

Pyroprocessing

Context:

Growing interest in advanced nuclear fuel cycles and resource-efficient industrial processes has renewed attention on pyroprocessing technologies.

What is Pyroprocessing?

- Use of **high temperatures** to physically or chemically transform materials.
- **Characteristics:**
  - High-temperature process
  - Dry process
  - Energy-intensive
  - Widely used in heavy industries

Where is Pyroprocessing used majorly?

- **Cement Industry:** The largest industrial application of pyroprocessing.
  - **Process**
    - Limestone, clay and iron ore are fed into a rotary kiln.
    - At around **900°C**, limestone decomposes and releases carbon dioxide.
    - At around **1450°C**, materials partially melt to form **clinker**.
  - **Output:** Cement clinker which is ground to produce cement.
- **Metallurgical Industry:** Used for extraction and refining of metals.
  - **Roasting:** Sulphide ores heated in the presence of air. Converts sulphides into oxides.
    - **Example:** Zinc sulphide → Zinc oxide
  - **Smelting:** Ore is melted. Metal separates from impurities.
  - **Calcination:**Heating of carbonate ores in limited or no air.
    - **Example:** Limestone → Lime
- **Nuclear Industry:** Used for **reprocessing spent nuclear fuel**.
  - **Process:**
    - Spent fuel is placed in a molten salt bath.
    - Usually contains lithium chloride and potassium chloride.
    - The temperature exceeds **500°C**.
    - Electric current is passed through the molten salt.
  - **Outcome**
    - Nuclear materials separate according to their electrochemical properties.
    - Valuable actinides can be recovered and reused.

Pyroprocessing is being studied or used in **Japan, South Korea,** and **the United States** particularly for advanced fast breeder and fast reactor technologies.

Why is it beneficial?

- **Resource Efficiency:** Recovers useful materials from waste streams.
- **Reduced Waste Generation:** Less long-term radioactive waste.
- **Supports Advanced Nuclear Technologies:** Complements fast reactor programmes.
- **Industrial Importance:** Essential for cement production, metal extraction, and nuclear fuel recycling.

Challenges

- **High Energy Requirement:** Extremely energy-intensive process.
- **Capital Intensive:** Requires specialised infrastructure and equipment.
- **Technological Complexity:** Particularly in nuclear fuel reprocessing.
- **Safety Concerns:** Handling high temperatures, molten salts, and radioactive materials.

IMI-Resistant Mustard Hybrids

Context:

From the **2026–27 rabi season**, India will begin large-scale cultivation of **imidazolinone-resistant (IMI-resistant) mustard hybrids** to tackle **Orobanche (Phelipanche)**, a parasitic weed that significantly reduces mustard productivity.

What are IMI-Resistant Mustard Hybrids?

- Mustard varieties that can tolerate **imidazolinone (IMI) herbicides**, which normally kill conventional mustard plants.
- **Key features:**
  - Developed through **mutation breeding**, which preserves naturally occurring mutations.
  - Not genetically modified (GM) crops.
  - Possess a modified **Acetolactate Synthase (ALS)** enzyme.
    - ALS is essential for plant growth.
    - A specific DNA change makes the enzyme resistant to IMI herbicides.
  - Survives IMI herbicide application while weeds are eliminated.
  - Enables effective control of parasitic weeds such as Orobanche.

Why are IMI-resistant mustard hybrids needed?

- India continues to face a large **edible oil deficit**.
- In 2024–25, India imported about **16 million tonnes** of edible oils worth around **₹1.6 lakh crore**.
- Mustard is a key oilseed crop, particularly in the arid regions of North India.
- Productivity is constrained by **Orobanche**, a parasitic root weed that:
  - Attaches to mustard roots.
  - Draws water and nutrients from the host plant.
  - Is difficult to remove through conventional weeding.
- IMI herbicide, when sprayed in the field, moves through the soil and plant system. It reaches Orobanche attached to mustard roots and destroys it while the mustard crop remains unaffected.

Why have farmers welcomed the technology?

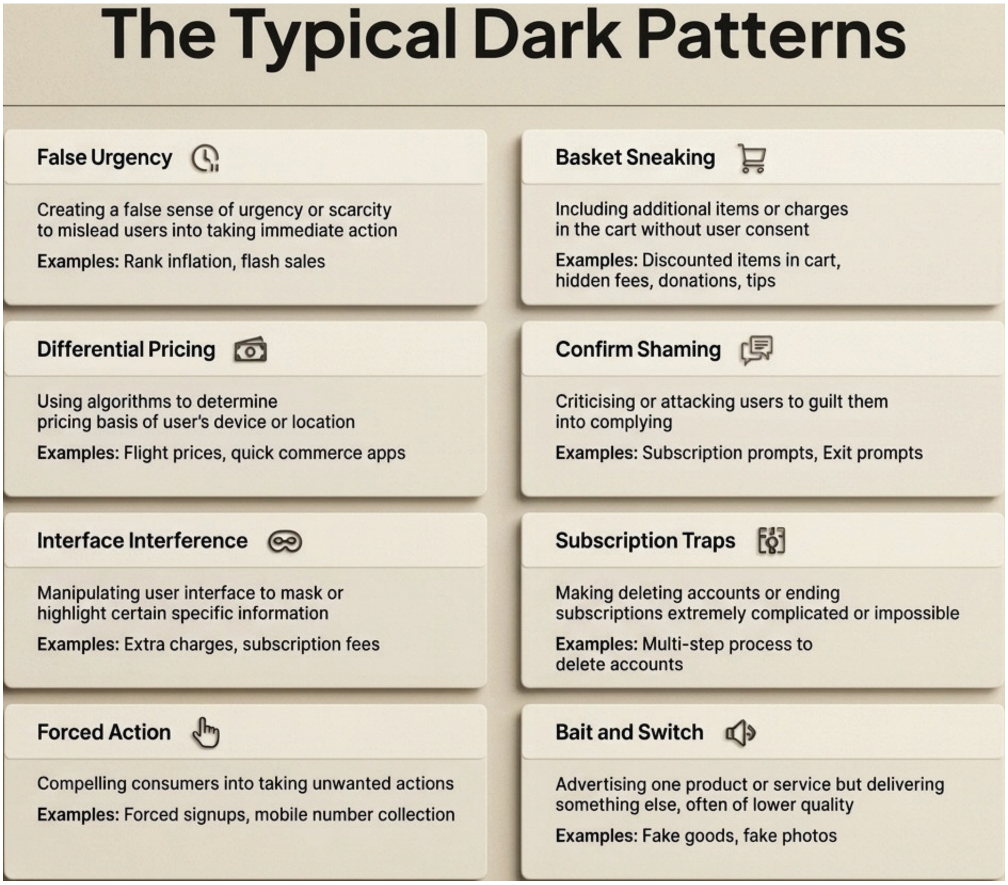
- Reduces dependence on manual labour.
- Useful during labour shortages.
- Enables timely weed management.
- Improves protection of oilseed yields.
- Provides an effective solution against parasitic weeds.

Dark Patterns

Context:

A report titled "**Dark Patterns in India's Online Marketplaces**" by Datum Intelligence estimates that Indian consumers lose **₹25,000–₹28,000 crore annually** due to deceptive online interface designs known as **dark patterns**.

Around **88% of India's 304 million online buyers** reportedly face losses through hidden charges, forced add-ons, drip pricing, false urgency, and subscription traps.



The Typical Dark Patterns

False Urgency

Creating a false sense of urgency or scarcity to mislead users into taking immediate action

Examples: Rank inflation, flash sales

Basket Sneaking

Including additional items or charges in the cart without user consent

Examples: Discounted items in cart, hidden fees, donations, tips

Differential Pricing

Using algorithms to determine pricing basis of user's device or location

Examples: Flight prices, quick commerce apps

Confirm Shaming

Criticising or attacking users to guilt them into complying

Examples: Subscription prompts, Exit prompts

Interface Interference

Manipulating user interface to mask or highlight certain specific information

Examples: Extra charges, subscription fees

Subscription Traps

Making deleting accounts or ending subscriptions extremely complicated or impossible

Examples: Multi-step process to delete accounts

Forced Action

Compelling consumers into taking unwanted actions

Examples: Forced signups, mobile number collection

Bait and Switch

Advertising one product or service but delivering something else, often of lower quality

Examples: Fake goods, fake photos

What are dark patterns?

- **Deceptive user interface (UI) or user experience (UX) designs** used in websites, apps and digital platforms to manipulate users into making decisions they may not have otherwise made that benefit the business rather than the consumer. They exploit human psychology such as:
    - Hurry
    - Fear of missing out (FOMO)
    - Inattention
    - Confusion
    - Laziness
    - Social pressure
- **Objective:**
    - Influence consumer behaviour
    - **Increase Purchases or subscriptions:** Encourage users to spend more money.
    - **Collect More Personal Data:** Obtain personal information that users may not willingly share.
    - **Reduce Cancellations:** Make it difficult to unsubscribe or opt out.
    - **Increase Engagement:** Keep users on the platform longer.

LIMITED TIME ONLY
BIG SALE
Flipkart
big
Festival
Sale
FESTIVE
SEASON
SALE
amazon

How does this work? (Types of Dark Patterns)

- **Hidden Charges:** Additional fees appear only at the final payment stage.
    - Convenience fee
    - Service charge
    - Platform charge
- **Forced Add-ons:** Consumers are automatically enrolled for extra products or services.
- **Drip Pricing:** Only a part of the total cost is shown initially; additional charges are revealed gradually.
- **False Urgency:** Artificial scarcity messages such as:
    - "Only 2 items left"
    - "Offer ends in 5 minutes"
- **Subscription Traps:** Easy sign-up but difficult cancellation process.
    - Free trial converts automatically into paid plan.
    - Cancellation buried under multiple menus.
- **Confirmshaming:** Designed to make refusal feel irrational.
    - Yes, I want to save money
    - No, I don't care about discounts
- **Preselection:** The more expensive option is already selected. Users may click "Continue" without noticing.
    - Premium delivery pre-ticked.
    - Insurance pre-selected.
- **Forced Action:** Users must create an account, share data, and accept permissions before accessing a service.
- **Fake scarcity:** May not reflect actual availability
    - "Only 1 room left!"
    - "Only 2 items remaining!"

India's regulatory response for Dark Patterns

- **Guidelines for Prevention and Regulation of Dark Patterns, 2023** issued by the **Central Consumer Protection Authority (CCPA)** under the Consumer Protection Act, 2019.
- **Key Features:**
    - Identifies and prohibits specified dark patterns.
    - Treats such practices as **unfair trade practices.**
    - Applicable to E-commerce platforms, Online marketplaces, Advertisers, and Sellers.

Why are Dark Patterns a concern?

- **Financial Losses:** Consumers spend more than intended.
- **Privacy Risks:** More personal data gets collected.
- **Informed Consent is Undermined:** Users may not fully understand what they are agreeing to.
- **Loss of Trust:** Reduces confidence in digital marketplaces.
- **Unfair Competition:** Ethical businesses are disadvantaged.

Varya: India's Indigenous Video Generation AI Model

Context:

Under the **IndiaAI Mission**, the Ministry of Electronics and Information Technology (MeitY) has officially unveiled **"Varya"**, India's first indigenous, distilled video story-generating AI model.

What is Varya?

- A **video generation foundation model** developed by **Avataar.ai** with support from the **IndiaAI Mission**.
- It is designed to:
    - Convert text prompts into videos.
    - Generate videos from images.
    - Create visual stories through sequential video clips.
    - Produce culturally relevant Indian visual content.
- **Intended Use Cases**
    - Education and e-learning
    - MSME advertising
    - Public information dissemination
    - Content creation
    - E-commerce marketing
    - Storytelling and entertainment

How is Varya different from conventional video AI models?

- Most AI video models generate videos through a process called **diffusion**.
    - The model starts with random visual noise.
    - Gradually removes noise step-by-step.
    - Usually requires 50 or more iterations.
    - Higher computation cost.
    - Longer processing time.
- Varya uses **model distillation** to reduce video generation from **50+ steps** to **4 steps** by maintaining comparable output quality.
- This makes video generation faster, cheaper and less compute-intensive

What is Model distillation?

A machine learning technique where:

- **Teacher Model**
    - Large and powerful AI model.
    - Generates high-quality outputs.
    - Computationally expensive.
- **Student Model**
    - Smaller and more efficient model.
    - Learns from outputs generated by the teacher model.
    - Replicates performance with fewer computations.

Teacher model = experienced professor solving a problem in 50 steps.

Student model = learns shortcuts and solves it in 4 steps while reaching a similar answer.

This process is called **knowledge distillation**.

VARYA
INDIA'S INDIGENOUS
VIDEO GENERATION AI MODEL
INDIA ai
A MEITY INITIATIVE
TEXT PROMPT
SCENE BUILD
STORYBOARD
VIDEO GENERATION
EXPORT

Environment & Ecology

Role of Ecosystem-based Adaptation in Climate Resilience

Context:

As climate change intensifies sea-level rise, cyclones, storm surges, and coastal erosion, India's adaptation response has largely relied on **engineered structures (Grey infrastructure)** such as seawalls, embankments, groynes, and tetrapods. However, recent cyclones such as **Dana, Amphan, and Yaas** have demonstrated the effectiveness of **Ecosystem-Based Adaptation (EbA)** through mangroves, seagrass meadows, coral reefs, and coastal wetlands in reducing climate risks while supporting livelihoods and biodiversity highlighting the need for mainstreaming ecosystem-based adaptation into India's coastal resilience and climate adaptation strategies.

What is Ecosystem based Adaptation (EbA)?

- Use of **biodiversity and ecosystem services** to help communities adapt to the adverse impacts of climate change while enhancing ecological resilience and livelihoods.
- It forms a subset of broader **Nature-based Solutions (NbS).**
- **Relevance:**
  - India has an **11,000 km coastline** which faces multiple climate-related risks:
    - Sea-level rise
    - Coastal erosion
    - Cyclones and storm surges
    - Saline water intrusion
    - Loss of coastal livelihoods
  - EbA reduces vulnerability and provides natural protection while preserving ecosystem functions by sustaining fisheries, agriculture, tourism, and livelihoods.
- **Major EbA ecosystems:**
  - **Mangroves:** Reduce storm surge intensity, stabilise coastlines, prevent erosion, and support fisheries.
  - **Seagrass Meadows:** Trap sediments,

    reduce wave energy, and act as blue-carbon ecosystems.
  - **Coral Reefs:** Function as natural breakwaters, dissipate wave energy, and protect coastal settlements.
  - **Coastal Wetlands:** Absorb floodwaters and enhance ecosystem resilience

EbA vs. Grey Infrastructure

Ecosystem-based Adaptation	Grey Infrastructure
Mangroves, coral reefs, wetlands	Seawalls, groynes, embankments
Self-sustaining and regenerative	Maintenance-intensive
Provides ecological and livelihood co-benefits	Primarily protective function
Enhances biodiversity	Limited ecological value
Long-term resilience	Can transfer risks elsewhere
Single-purpose	Multipurpose

Why is EbA important for India?

- Provides natural protection against coastal hazards.
- Supports fisheries, tourism, honey collection, and crab farming
- Protects ecologically sensitive coastal habitats.
- Mangroves and seagrasses act as important carbon sinks.

Despite being effective, why is EbA marginal in India?

- **Policy Bias:** India prefers **visible grey infrastructure** over ecosystem-based approaches.
- **Recognition Failure:** Mangrove restoration and ecosystem projects are not recognised as adaptation interventions.
- **Classification Problem:** No clear framework exists to identify and classify EbA projects.
- **Fragmented Governance:** EbA interventions are scattered across conservation programmes, restoration schemes, and development projects instead of forming a coherent adaptation strategy.
- **Finance and Monitoring Gap:** Benefits are not properly measured, tracked, or funded.

MISHTI (Mangrove Initiative for Shoreline Habitats & Tangible Incomes)

- **Objective:**
  - Restoration of mangrove ecosystems.
  - Strengthening coastal resilience.
  - Improving livelihoods of coastal communities.
- **Target:** Restoration of approximately **540 sq km of mangroves across nine States**.
- **Challenge:** The initiative is largely framed as a restoration programme, resulting in adaptation benefits not being adequately captured in climate adaptation accounting.

What should India do to promote EbA into climate resilience?

- Recognise EbA as **adaptation policy** not merely as conservation activity.
- Create clear **classification systems** so adaptation outcomes can be measured.
- **Integrate EbA into planning** by moving from scattered projects to a coherent adaptation strategy.
- Mainstream EbA in finance as **adaptation funding** captures ecosystem benefits.
- **Embed EbA into coastal governance** (i.e., treat ecosystems as infrastructure).

Data Nuggets

- India's coastline: **~11,000 km**
- Coastal States spent about **₹2,641 crore** on hard coastal protection measures over the last decade.
- The National Coastal Mission budget declined from **₹195 crore (2022-23)** to **₹50 crore (2024-25)**.

Successful Examples of EbA:

- Odisha mangroves reduced impacts of **Cyclone Dana.**
- About **18,000 women restored 4,600 hectares of mangroves** in the Sundarbans.

Conclusion:

India's most durable coastal defence may lie not in higher seawalls but in healthier ecosystems. Mainstreaming ecosystem-based adaptation can simultaneously strengthen climate resilience, biodiversity conservation, and livelihood security.

Surface Ozone

Context:

A study published in the journal **npj Clean Air** found that heatwaves significantly increase **surface ozone** levels across India.

What is Surface Ozone?

- Also known as Ground-level ozone.
- A harmful air pollutant present in the lower atmosphere (troposphere).
- Damages human health, crops, and ecosystems.
- **How is it different from the ozone layer?**
  - **Stratospheric Ozone** is located in the upper atmosphere.
  - Forms the ozone layer that protects Earth from harmful ultraviolet radiation.
- **Formation:**
  - Surface ozone is a **secondary pollutant**, meaning it is not emitted directly.
  - It forms when sunlight triggers chemical reactions between precursor pollutants such as:
    - Nitrogen Oxides (NOx)
    - Volatile Organic Compounds (VOCs)
    - Formaldehyde (HCHO)
  - Heatwaves accelerate these photochemical reactions, causing ozone concentrations to rise sharply.
  - **Simple Process:** NOx + VOCs + Sunlight + High Temperature → Surface Ozone (O_3)
- **Impact on human health:** Surface ozone can:
  - Irritate lungs and airways.
  - Reduce lung function.
  - Aggravate asthma and COPD.
  - Increase cardiovascular stress.
  - Raise risks of premature mortality.
- Heatwave-driven ozone exposure in 2024 resulted in ~26,500 deaths from **Ischaemic Heart Disease** and Chronic Obstructive Pulmonary Disease (COPD).

*During heatwave periods, ozone concentrations in northern India reached **85–110 $\mu g/m^3$**, exceeding the **WHO guideline of 70 $\mu g/m^3$**.*

What makes India particularly vulnerable to ozone pollution?

- Frequent and intense heatwaves.
- Rapid urbanisation.
- Vehicular emissions.
- Industrial pollution.
- Biomass burning.
- High solar radiation during pre-monsoon months.

*The study examined **188 heatwave events** over two decades and observed a long-term rise in ozone levels, particularly in the **Western Himalayas**.*

Primary vs Secondary Pollutants

Feature	Primary Pollutants	Secondary Pollutants
Meaning	Pollutants released directly into the atmosphere from a source	Pollutants formed in the atmosphere through chemical reactions
Source	Emitted from vehicles, industries, power plants, biomass burning, etc.	Formed when primary pollutants react with sunlight, water vapour, oxygen, or other chemicals
Directly Emitted?	Yes	No
Formation Process	Enter atmosphere in harmful form	Produced after atmospheric transformations
Role of Sunlight	Not necessary for emission	Often essential for formation
Time of Formation	At the source itself	Away from the source, after reactions occur
Control Strategy	Control emissions at source	Control precursor pollutants that lead to their formation
Examples	Carbon Monoxide (CO), Sulphur Dioxide (SO_2), Nitrogen Oxides (NOx), Particulate Matter (PM), Lead	Ozone (O_3), Peroxyacetyl Nitrate (PAN), Sulphuric Acid (H_2SO_4), Nitric Acid (HNO_3), Secondary PM

Joint Crediting Mechanism

Context:

India and Japan have adopted the **Rules of Implementation for the Joint Crediting Mechanism (JCM)** under **Article 6.2 of the Paris Agreement**.

What is Joint Crediting Mechanism (JCM)?

- A bilateral carbon market mechanism through which:
  - One country supports emission-reduction projects in another country.
  - The resulting greenhouse gas (GHG) reductions are quantified and verified.
  - The generated carbon credits are shared between the participating countries.
- In simple terms, **Japan can invest in low-carbon projects in India, and both countries can count part of the resulting emission reductions toward their climate targets.**

Let us understand through an example:

- Suppose Japan finances a Solar power plant, Green hydrogen project, and Energy-efficient industrial technology in India.
- If the project reduces **1 million tonnes of CO_2 emissions**, the emission reductions are measured and converted into carbon credits.
- These credits are then allocated between India and Japan under agreed rules, helping both countries meet their climate commitments.

What is Article 6.2 of the Paris Agreement?

- It allows countries to cooperate voluntarily in achieving their **Nationally Determined Contributions (NDCs)** through the transfer of emission reductions.
- **Objective:** Instead of reducing emissions entirely within their own borders, countries can:
  - Collaborate on mitigation projects.
  - Trade verified emission reductions.
  - Reduce the overall cost of climate action.

Why is it Important for India?

- **Access to Climate Finance:** Attracts Japanese investment into low-carbon projects.
- **Technology Upgradation:** Enables adoption of advanced clean technologies.
- **Supports India's NDCs:** Helps achieve emissions-intensity reduction and clean-energy goals.
- **Industrial Decarbonisation:** Encourages cleaner production processes.
- **Green Growth:** Aligns climate action with economic development.

Internal Security

Land Port Management System

Context:

Union Home Minister **Amit Shah** launched the **Land Port Management System (LPMS)** named **'Vinimay'** to modernise and digitise cargo and passenger processing at India's land ports.

What is LPMS?

- A **digital platform/software system** launched for managing operations at land ports that enables:
  - End-to-end digital workflow for cargo processing.
  - Digital management of passenger movement.
  - Interoperable and transparent border management.
  - Integration of stakeholders operating at land ports.
- India's land ports handle significant cross-border trade and movement, but processes often involve:
  - Multiple agencies.
  - Paper-based documentation.
  - Delays in cargo clearance.
  - Higher transaction costs.
- LPMS aims to **bring land ports closer to the digital standards** already adopted at airports and seaports.
- According to government estimates, LPMS is expected to:
  - Reduce paperwork by about **90%**.
  - Reduce cargo truck waiting time by **22–35%**.
  - Reduce gate-processing time by **40–60%**.
  - Improve efficiency and transparency in border trade.
- LPMS forms part of the government's broader push towards **Smart Borders, Technology-enabled border governance, Faster trade facilitation, and Enhanced security and monitoring.**
- **LPAI** manages land ports and uses **LPMS** for digital operations.

Land Ports Authority of India (LPAI)

- Statutory body under the **Ministry of Home Affairs**.
- Established under the **Land Ports Authority of India Act, 2010**.
- Develops, manages and maintains **Integrated Check Posts (ICPs)** at India's international land borders.
- Responsible for physical infrastructure and border trade facilitation.

Drone Revolution and Modern Warfare

Context:

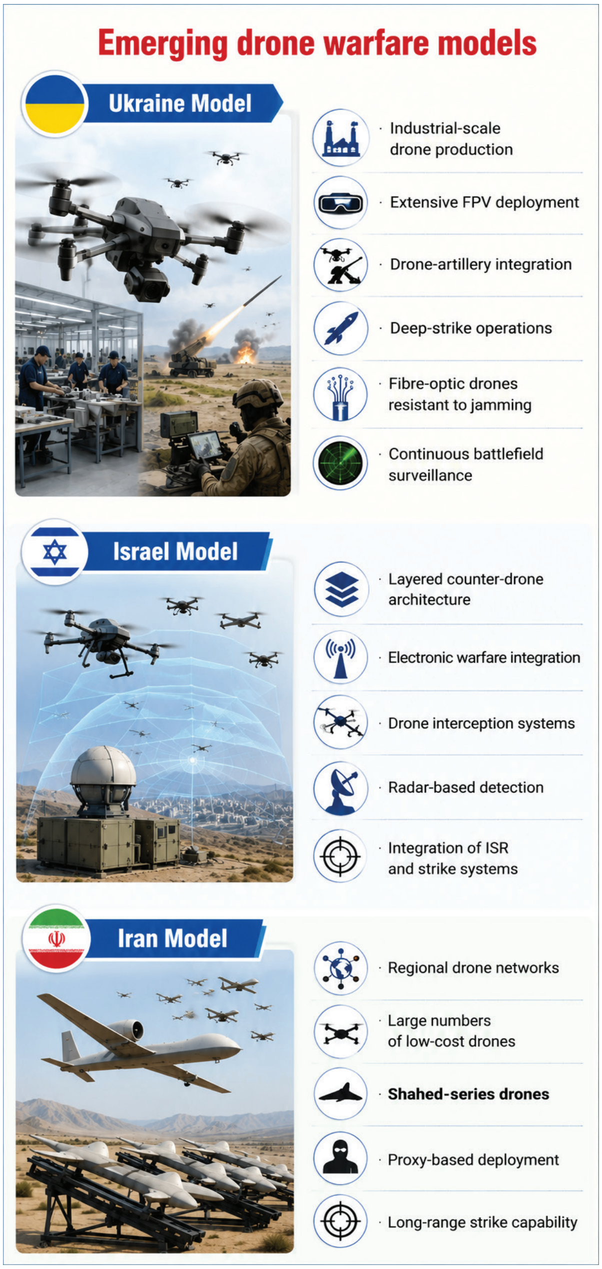
Ongoing conflicts in **Ukraine, Lebanon and West Asia** have demonstrated how drones have become central to modern warfare, transforming military power from platform-centric warfare to networked and industrial-scale warfare.

How has drone warfare evolved?

- **Traditional military paradigm:** Traditional military superiority depended on tanks, artillery, fighter aircraft, precision-guided missiles, and large defence budgets.
- **Emergence of drone warfare:** Drones evolved from reconnaissance tools into ISR platforms, artillery spotters, precision strike systems, loitering munitions, electronic warfare assets, and logistics support platforms.
- **Ukraine's FPV revolution:** Ukraine transformed commercially available drones into FPV strike drones, loitering munitions, long-range UAVs, and fibre-optic drones.
    - o **Result:**
        - ✻ Low-cost precision warfare
        - ✻ Deep-strike capability
        - ✻ Continuous battlefield surveillance
    - o An **FPV drone** allows the operator to see exactly what the drone sees through an onboard camera.
    - o FPV drones are cheap, fast, highly manoeuvrable, and difficult to intercept
    - o They can be converted into Kamikaze drones, Bomber drones, Anti-tank drones, and Precision strike weapons.

FPV Drone vs Conventional Drone

Feature	FPV Drone	Conventional Military Drone
Cost	Very low	High
Control	Real-time manual control	Often automated
Speed	High	Moderate
Precision	Very high	High
Battlefield Use	Tactical strikes	ISR and strategic missions
Vulnerability	Lower due to agility	Higher visibility



Emerging drone warfare models

Ukraine Model

- Industrial-scale drone production
- Extensive FPV deployment
- Drone-artillery integration
- Deep-strike operations
- Fibre-optic drones resistant to jamming
- Continuous battlefield surveillance

Israel Model

- Layered counter-drone architecture
- Electronic warfare integration
- Drone interception systems
- Radar-based detection
- Integration of ISR and strike systems

Iran Model

- Regional drone networks
- Large numbers of low-cost drones
- **Shahed-series drones**
- Proxy-based deployment
- Long-range strike capability

How has drone warfare changed the nature of military power and modern warfare?

- **End of traditional battlefield superiority**
    - o **Earlier:** Expensive platforms determined military dominance.
    - o **Now:** Cheap drones can destroy tanks, artillery and high-value military assets.
- **Battlefield transparency:** Continuous ISR has reduced Concealment, Surprise, and Rear-area security
    - o No area of the battlefield remains fully insulated from surveillance.
- **Shift from platform-centric warfare**

    - **Earlier:** Tank-centric warfare, and Aircraft-centric warfare
    - **Now:**
        - Network-centric warfare
        - Drone-centric operations
        - Sensor-shooter integration
    - Military effectiveness increasingly depends on information dominance.
- **Warfare as an industrial competition:**
    - Victory increasingly depends on:
        - Production scale
        - Manufacturing capacity
        - Supply chains
        - Technological adaptation
        - Rapid innovation cycles
    - Warfare is becoming a contest of industrial endurance as much as battlefield skill.

Loitering Munitions

- Loitering munitions are drones that:
    - Fly over an area searching for targets.
    - Identify a target.
    - Crash into the target carrying explosives.
- Hence they are often called "**Kamikaze drones**" or "**Suicide drones**".
- **Examples:** RAM II (Ukraine), Iranian Shahed series

Fibre-Optic Drones

- Traditional drones communicate using radio signals. These signals can be jammed, spoofed, and disrupted electronically.
- Whereas, **fibre-optic drones** instead of radio signals, remain connected through a thin fibre-optic cable.
- **Advantages**
    - Resistant to jamming
    - Harder to intercept electronically
    - More reliable in contested environments
- **Limitation:** Restricted by cable length

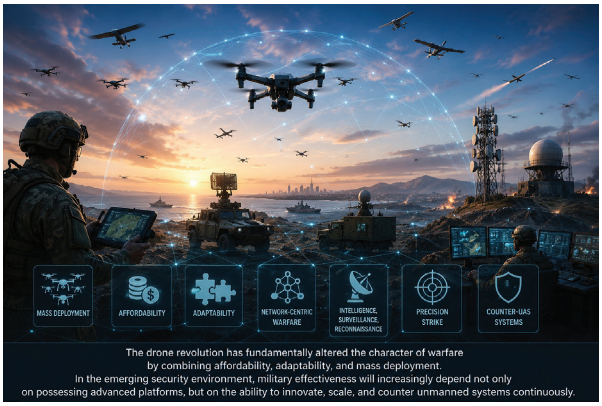
How to prepare for drone-centric warfare?

Incremental measures

- **Expand Indigenous Drone Production:** Strengthen domestic manufacturing of surveillance, combat, and logistics drones.
- **Strengthen Counter-Drone Systems:** Deploy radar, jamming, interception, and directed-energy systems.
- **Integrate Drones Across Services:** Improve coordination between Army, Navy, and Air Force drone operations.
- **Enhance Battlefield Intelligence:** Link drones with ISR networks and precision-strike capabilities

Disruptive measures

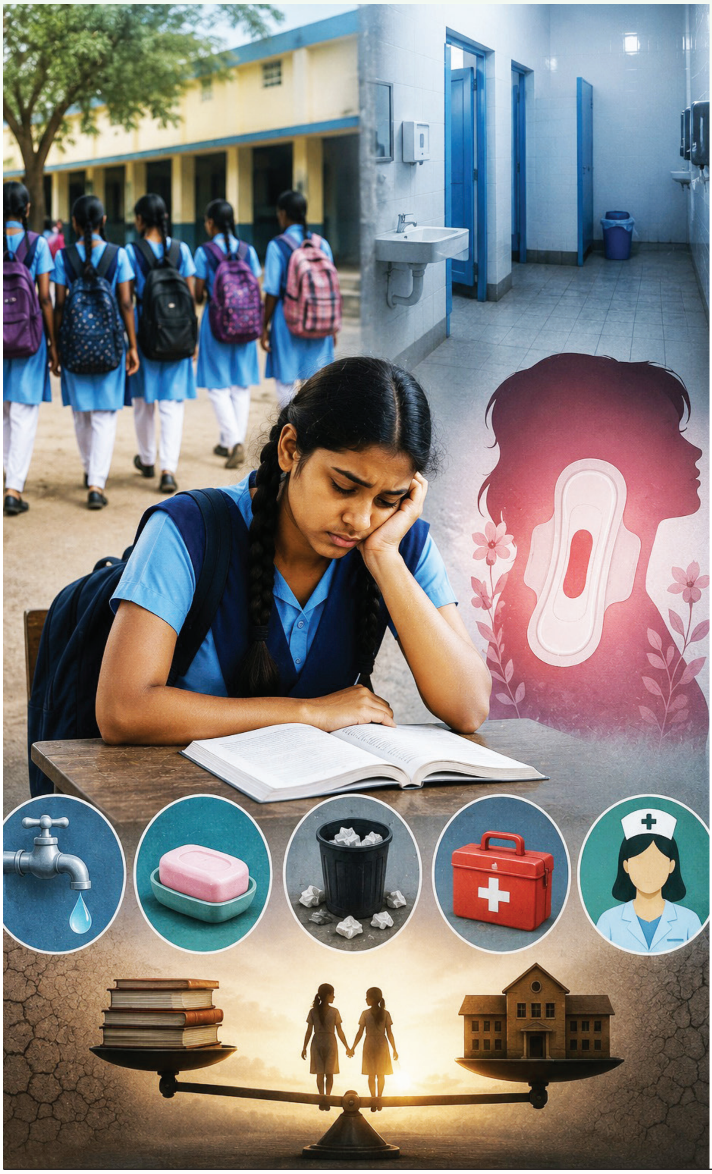
- **Shift from Platform-Centric to Drone-Centric Doctrine:** Reorient military planning around unmanned systems and networked operations.
- **Build Drone Swarm Capabilities:** Develop mass-deployment capabilities rather than relying solely on high-value platforms.
- **Create Layered Counter-Drone Architecture:** Integrate electronic warfare, kinetic interception, AI-enabled detection, and directed-energy weapons.
- **Adopt Continuous Innovation Models:** Shorten procurement cycles to match the pace of technological change.


MASS DEPLOYMENT
AFFORDABILITY
ADAPTABILITY
NETWORK-CENTRIC WARFARE
INTELLIGENCE, SURVEILLANCE, RECONNAISSANCE
PRECISION STRIKE
COUNTER-UAS SYSTEMS
The drone revolution has fundamentally altered the character of warfare
by combining affordability, adaptability, and mass deployment.
In the emerging security environment, military effectiveness will increasingly depend not only
on possessing advanced platforms, but on the ability to innovate, scale, and counter unmanned systems continuously.

Conclusion:

The drone revolution has fundamentally altered the character of warfare by combining affordability, adaptability, and mass deployment. In the emerging security environment, military effectiveness will increasingly depend not only on possessing advanced platforms, but on the ability to innovate, scale, and counter unmanned systems continuously.

Society & Ethics



Impact of Menstrual Health on School Absenteeism: Case Study of Odisha

Context:

A study was conducted by a consortium of organisations, across schools and public institutions in Odisha to examine menstrual hygiene, sanitation infrastructure, and school absenteeism among girls.

Key details about TB

- Assessed menstrual health challenges among adolescent girls in Odisha.
- Covered **177 respondents** across:
  - **121 schools**
  - **56 public institutions**
- Conducted across both rural and urban areas with support from organizations including **UNICEF**, **WaterAid**, and other institutions.

Key findings of the study:

- **74% of girls** reported missing **1–8 days of school per menstrual cycle**.
- Main reasons for absenteeism:
  - Pain and discomfort
  - Lack of privacy
  - Inadequate sanitation facilities
  - Social stigma
- **94% of schools** had separate toilets for girls, but:
  - Many lacked adequate water and soap.
  - Menstrual hygiene support systems remained inadequate.
- Around **56% of schools**:
  - Lacked menstrual waste disposal facilities, or
  - Relied on unsafe disposal methods.
- Only **27% of schools** had a nurse or health worker.
- Only **44%** reported availability of first-aid kits.

What does this indicate?

- Menstrual hygiene challenges continue to affect:
  - School attendance
  - Educational outcomes
  - Dignity and well-being of girls
- Lack of inclusive and period-friendly sanitation infrastructure remains a major barrier.

Unpaid Domestic Labour of Homeworkers

Context:

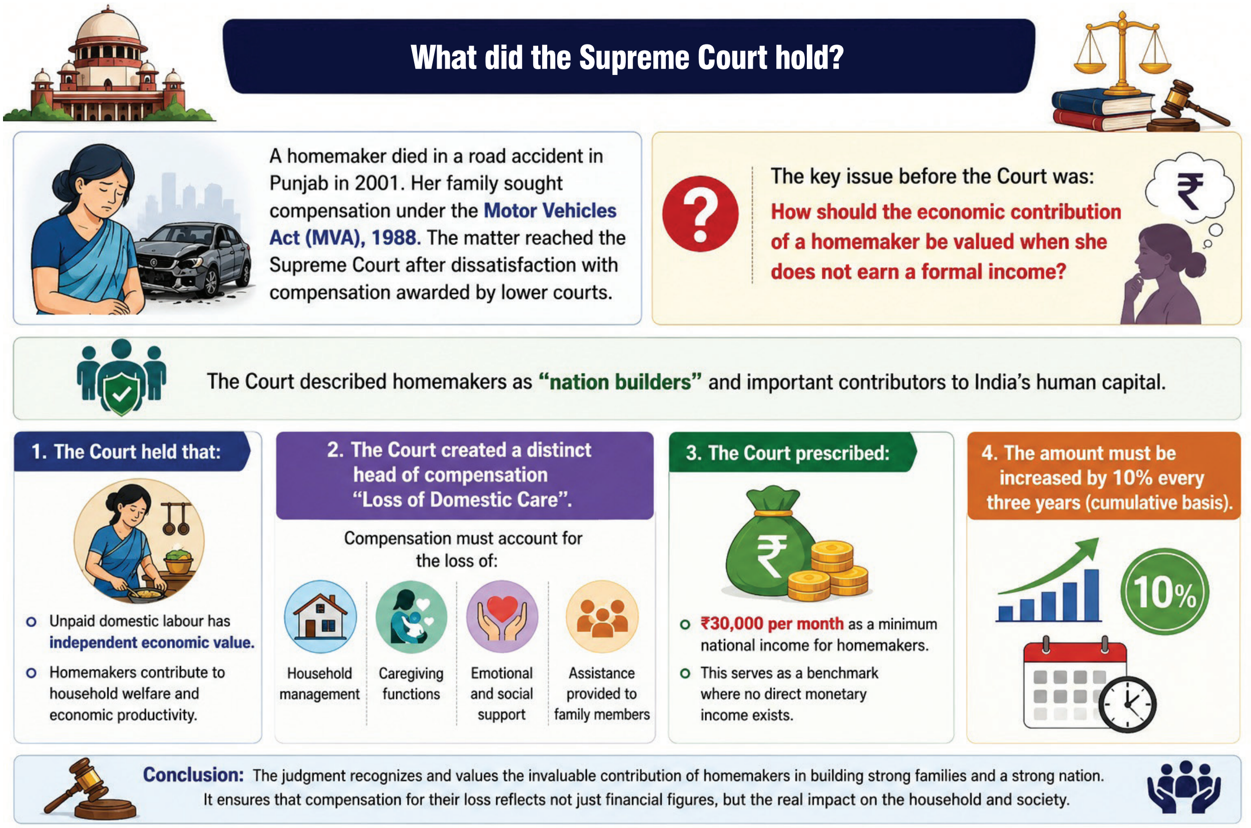
In **Kirti & Ors. vs Oriental Insurance Co. Ltd. (2025)**, the Supreme Court recognised that **unpaid domestic labour performed by homemakers has an independent economic value** while determining compensation in motor accident cases.

What is unpaid domestic work?

- **Household and caregiving activities** performed **without direct monetary compensation**, such as cooking and cleaning, childcare, elderly care, household management, emotional and reproductive care work.
- **Time Use Survey (NSO)** consistently shows women spend substantially more time on unpaid domestic work than men.

What are the constitutional and policy foundations for recognising unpaid care work?

- **Article 14** – Equality before law
- **Article 15(3)** – Special provisions for women
- **Article 39(a)** – Adequate means of livelihood
- **Article 39(d)** – Equal pay for equal work
- **Sustainable Development Goal (SDG) 5.4** calls for recognising and valuing unpaid care and domestic work.



What did the Supreme Court hold?

A homemaker died in a road accident in Punjab in 2001. Her family sought compensation under the **Motor Vehicles Act (MVA), 1988.** The matter reached the Supreme Court after dissatisfaction with compensation awarded by lower courts.

The key issue before the Court was: **How should the economic contribution of a homemaker be valued when she does not earn a formal income?**

The Court described homemakers as **"nation builders"** and important contributors to India's human capital.

1. The Court held that:

- Unpaid domestic labour has **independent economic value.**
- Homemakers contribute to household welfare and economic productivity.

2. The Court created a distinct head of compensation "Loss of Domestic Care".

Compensation must account for the loss of:

Household management	Caregiving functions	Emotional and social support	Assistance provided to family members

3. The Court prescribed:

- **₹30,000 per month** as a minimum national income for homemakers.
- This serves as a benchmark where no direct monetary income exists.

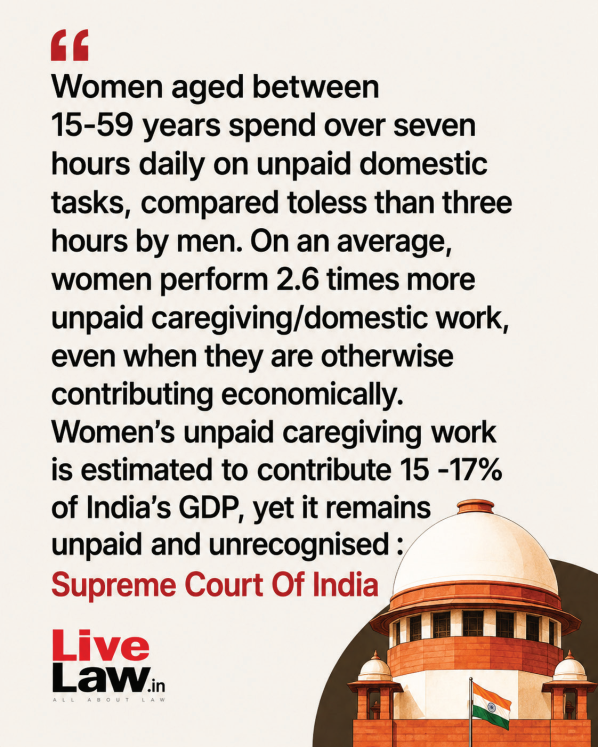
4. The amount must be increased by 10% every three years (cumulative basis).

Conclusion: The judgment recognizes and values the invaluable contribution of homemakers in building strong families and a strong nation. It ensures that compensation for their loss reflects not just financial figures, but the real impact on the household and society.

What does the ruling signify?

- **Shift in Judicial Approach:**
  - o Moves beyond treating economic contribution solely in terms of wage income.
  - o Recognises the value of non-market labour.
- **Greater Gender Sensitivity:** Acknowledges the historically invisible contribution of women within households.
- **More Consistent Compensation Framework:**
  - o Provides tribunals with a benchmark for assessing compensation.
  - o Reduces arbitrariness in valuation.
- **Recognition of Care Economy:** Affirms that

domestic and caregiving work contributes to social and economic well-being even when not reflected in GDP.



Women aged between 15-59 years spend over seven hours daily on unpaid domestic tasks, compared toless than three hours by men. On an average, women perform 2.6 times more unpaid caregiving/domestic work, even when they are otherwise contributing economically. Women's unpaid caregiving work is estimated to contribute 15 -17% of India's GDP, yet it remains unpaid and unrecognised : Supreme Court Of India

What are the limitations of this judgement?

The Court itself acknowledged that:

- No mathematical formula can fully capture the economic, social, and emotional value of homemakers' work.
- The ₹30,000 benchmark is a practical legal standard rather than a precise economic valuation.

Why has unpaid domestic labour remained undervalued?

Structural factors

- **Patriarchal Gender Norms**
  - o Household work is traditionally viewed as women's natural duty rather than productive labour.
  - o Care responsibilities are disproportionately assigned to women.
- **Market-Centric Economic Measurement**
  - o GDP captures market transactions but excludes most unpaid household services.
  - o Economic contribution becomes invisible despite social importance.
- **Gendered Division of Labour**
  - o Women undertake a significantly higher share of unpaid care work.
  - o Limits labour-force participation and economic independence.
- **Legal and Policy Neglect**
  - o Compensation frameworks historically focused on income earners.
  - o Homemakers' contributions often lacked objective valuation.

Contemporary factors

- **Growing Recognition of Care Economy**
  - o Increasing focus on unpaid care work in gender and development discourse.
  - o International organisations advocate integrating care work into policy design.
- **Judicial Expansion of Gender Justice**
  - o Courts increasingly recognise substantive equality rather than formal equality.
  - o Compensation jurisprudence is evolving to acknowledge non-market contributions.
- **Changing Family Structures**
  - o Nuclear families increase dependence on caregiving performed within households.
  - o Replacement cost of domestic services has become more visible.

Conclusion:

The Supreme Court's ruling marks an important shift from viewing homemakers as dependents to recognising them as contributors to household and national well-being. The larger challenge is to ensure that unpaid care work receives not only legal recognition but also social, economic and policy acknowledgement, advancing gender equality and inclusive development.

Urban Water Security Crisis

Context:

Urban India is witnessing recurring summer water crises, with cities such as Delhi, Chennai, Bengaluru and Hyderabad facing shortages despite repeated emergency measures like tanker deployment and rationing.

Why are Indian cities repeatedly facing water shortages?

Structural factors

- **Water governance remains supply-centric:** Cities focus on finding new water sources rather than improving management of existing systems.

- **Neglect of urban water infrastructure:** Insufficient attention to leak repairs, pipeline maintenance, distribution efficiency, and wastewater reuse results in large volumes of water being lost before reaching consumers.
- **Unsustainable groundwater dependence:** Groundwater is being extracted faster than natural recharge rates, weakening long-term urban water security.
- **Degradation of local water bodies:** Lakes, tanks, ponds and stormwater channels that historically moderated floods and droughts have been encroached upon or converted.
- **Weak urban planning:** Rapid urbanisation has increased water demand without corresponding investments in water infrastructure and resource management.

Contemporary factors

- **Extreme summer conditions:** High temperatures, dry spells and delayed rainfall intensify seasonal water stress.
- **Growing demand pressures:** Population growth and rising urban consumption increase stress on already stretched systems during peak summer months.
- **Poor crisis preparedness:** Cities often respond through emergency tanker supply and ad hoc arrangements rather than pre-planned water management strategies.

How can Indian cities become water secure?

Incremental measures

- **Transparent emergency water planning:** Clear supply schedules, prioritisation norms and contingency plans during shortages.
- **Reducing distribution losses:** Leak detection, pipeline maintenance and repair of hidden leakages.
- **Managing urban water demand:** Conservation measures and restrictions on non-essential water use during peak summer months.
- **Strengthening water quality safeguards:** Monitoring contamination risks and ensuring safe storage and treatment during shortages.

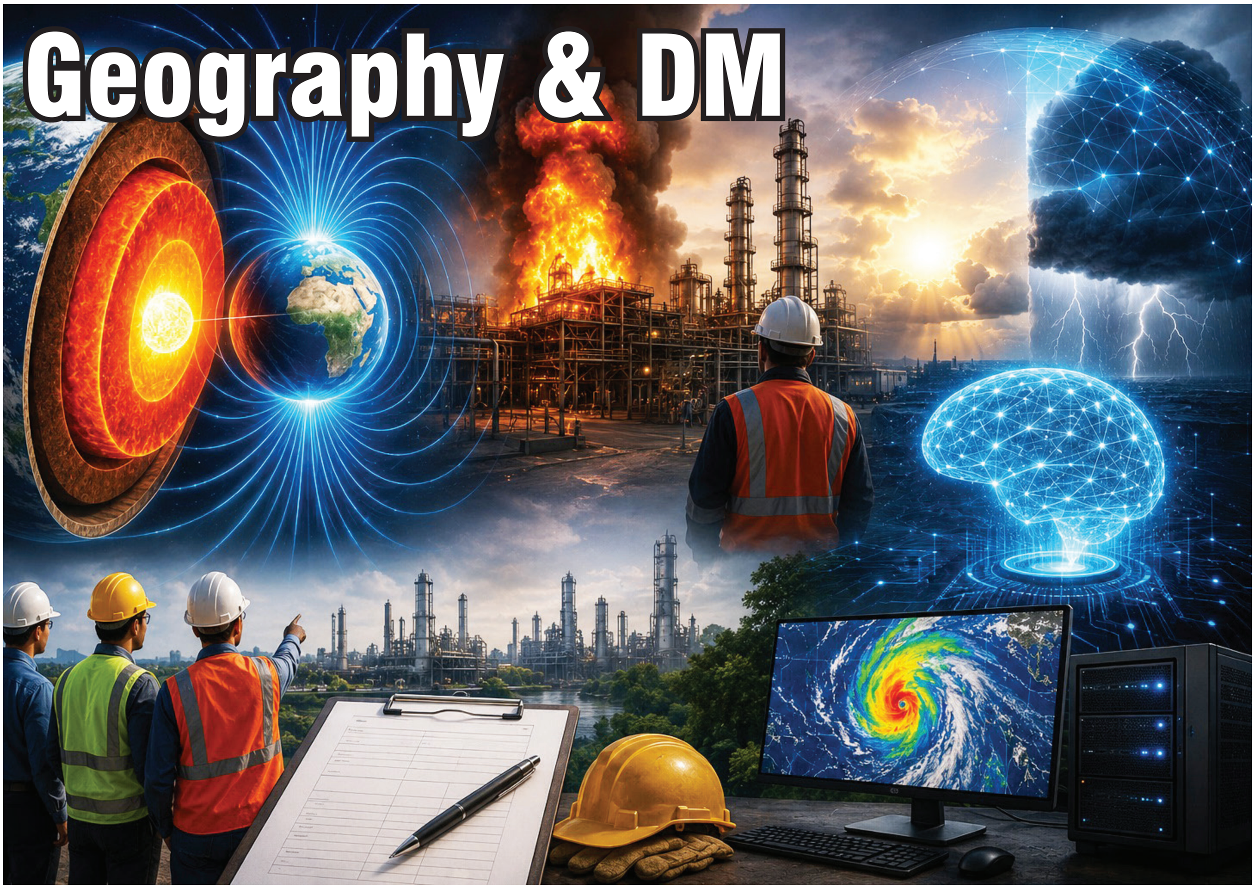
Disruptive measures

- **Scaling wastewater treatment and reuse:** Expanding recycling of treated wastewater to augment water availability.
- **Building circular urban water systems:** Integrating water supply, wastewater management and reuse into a unified framework.
- **Shifting from crisis response to resilience planning:** Moving beyond tanker-based emergency management towards long-term water security strategies.

Conclusion:

Urban water crises are becoming a recurring feature of Indian summers. Moving beyond emergency tanker-based responses will require transparent planning, reduction of distribution losses, responsible water use, protection of water quality, and greater reuse of treated wastewater to build more resilient cities.

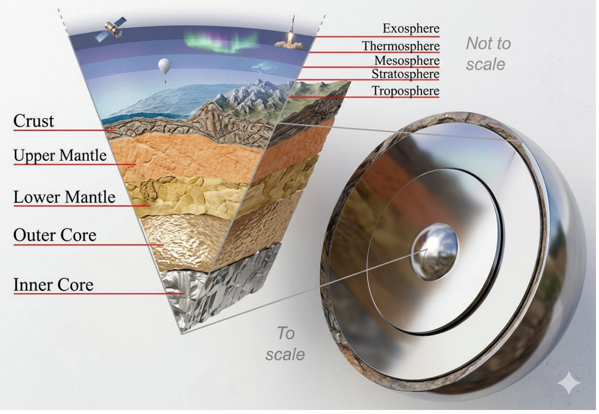
Geography & DM



Earth's Outer Core & Magnetic Field Dynamics

Context:

Researchers from the University of Edinburgh and the British Geological Survey have identified **unusual changes in the flow of molten iron in Earth's outer core**, which may explain sudden variations in Earth's magnetic field.


Exosphere
Thermosphere
Mesosphere
Stratosphere
Troposphere
Not to scale
Crust
Upper Mantle
Lower Mantle
Outer Core
Inner Core
To scale

What is Earth's Outer Core?

- A **liquid layer** located around **2,800 km below Earth's surface**
- Composed mainly of **molten iron and nickel** which move continuously
- Lies between lower mantle and inner core
- Extremely high temperature
- **Importance:**
    - o Continuous movement of molten metals generates electric currents which produce Earth's magnetic field through the **geodynamo process**.
    - o Earth's magnetic field:
        - ✻ Shields the planet from harmful solar radiation
        - ✻ Protects the atmosphere from solar wind erosion
        - ✻ Supports satellite communication and navigation systems

What did the study find?

Study based on **27 years of data** found,

- Around 2010, liquid iron flow beneath the **equatorial Pacific** shifted from slow westward movement to a faster eastward surge.
- The shift reportedly weakened around 2020.
- Flow patterns appear rapidly changeable and uneven between northern and southern hemispheres.

What is the scientific significance of this finding?

- Helps explain:
    - Sudden **"jerks"** in magnetic field readings
    - Rapid changes inside Earth's deep interior
- Suggests **outer core liquids can change direction faster** than previously believed

Conclusion:

Understanding Earth's deep interior can improve magnetic field modelling and strengthen scientific knowledge about planetary processes, space weather protection, and long-term geophysical changes.

Industrial Accidents in India: Reporting Challenges

Context:

The recent explosion at the **Rashtriya Ispat Nigam Limited (RINL), Visakhapatnam Steel Plant** has once again highlighted concerns regarding **industrial safety, accident reporting, factory inspections, and institutional capacity** in India.

Who is responsible for industrial safety in India?

- **Directorate General Factory Advice Service and Labour Institutes (DGFASLI)**
    - Apex technical body under the **Ministry of Labour & Employment.**
    - Assists implementation of:
        - ✻ **Factories Act, 1948**
        - ✻ Occupational Safety, Health and Working Conditions (OSH) Code, 2020
    - Collects factory accident data.
    - Conducts inspections and provides technical guidance.
    - Under the **OSH Code, 2020**, DGFASLI has been renamed as the **Directorate General of Occupational Safety and Health (DGOSH).**
- **Chief Inspectors of Factories (CIFs):** State-level authorities responsible for enforcement and reporting.
- **Labour Bureau:** Compiles labour statistics including:
    - Fatal injuries
    - Non-fatal injuries
    - Industrial accidents

Chart 1: Deaths (🟥) and injuries (🟦) reported in fire accidents in factories, as per ADSI reports

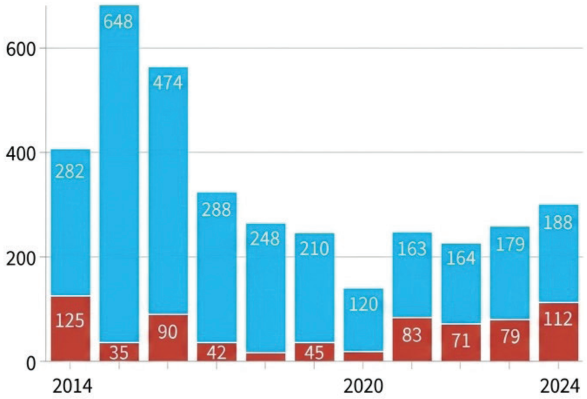


Chart 2: The number of registered factories in each year (🟦) and the number of employees in millions (—)

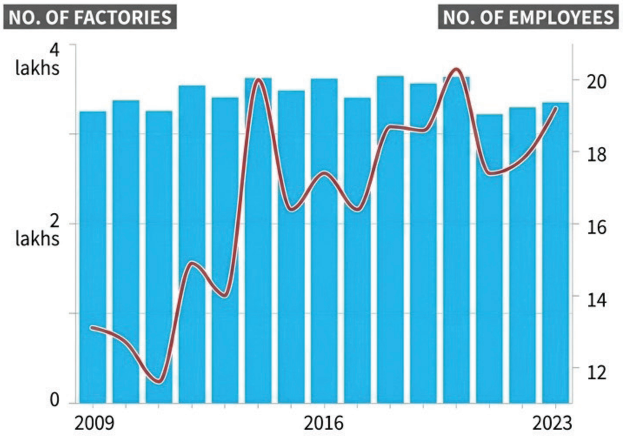


Chart 3: Fatal and non-fatal injuries as per the Labour Bureau (LB) and (CIFs), which vary widely over the years, with a few showing unexplained swings in the SRNS

Chart 4: The year-wise vacancies (🟥) and filled positions (🟦) in DGFASLI. Nearly 50% of the 349 sanctioned posts remained vacant as of 2023

What makes it difficult to avoid industrial accidents?

- **Reporting gaps:** Industrial accident statistics are compiled through Labour Bureau records and DGFASLI Standard Reference Notes (SRNs). However, both datasets show different figures.
    - Fatal and non-fatal injury data reported by different agencies often do not match.
    - Several fluctuations remain unexplained.
- **Declining inspection coverage:** The share of factories inspected annually has declined from around **32–40% of factories** in the early years to around **20% in recent years**.

  - This is due to a **severe manpower shortage.** A single inspector is often responsible for hundreds of factories.

State	Number of factories	Inspectors of Factories	Factories per inspector
Tamil Nadu	50,669	106	478
Gujarat	49,246	81	608
Maharashtra	39,533	44	898
Haryana	25,607	35	732
A.P.	24,642	42	587
Kerala	22,601	53	426
Telangana	22,118	27	819
Karnataka	18,389	48	383
Delhi	13,616	7	1,945
Rajasthan	11,014	27	408

- **High vacancies in DGFASLI/DGOSH:** Nearly **50% of sanctioned posts remained vacant** in DGFASLI as of 2023 which led to weak inspection capacity.
- **Underreporting of fire accidents:** Fire accidents captured in DGFASLI records were only about **one-third** of those reported in Accidental Deaths and Suicides in India (ADSI) reports.
- **Poor compliance by States:** Several States have not consistently submitted accident data. Missing data creates:
  - Incomplete national statistics
  - Underestimation of industrial risks
  - Weak evidence-based policymaking

Conclusion:

India's industrial safety challenge extends beyond individual factory accidents to systemic weaknesses in reporting, inspection and regulatory oversight. Strengthening data integrity, inspection capacity and institutional accountability will be essential to ensuring that industrial growth is accompanied by safer workplaces and stronger labour protection.

Limitations of AI in Weather Forecasting

Context:

A study published in the journal *Science Advances* found that though AI-based weather forecasting models often outperform traditional methods for routine weather prediction, they perform poorly in forecasting **record-breaking and unprecedented extreme weather events** such as severe heatwaves, floods, and storms.

How do AI weather forecasting models work?

- AI weather models:
  - Learn patterns from historical weather data.
  - Use large datasets to identify relationships between atmospheric variables.
  - Generate forecasts faster and at lower computational cost than traditional models.
- **Examples:** GraphCast (Google DeepMind), Pangu-Weather (Huawei), Fuxi

How do traditional weather models work?

Traditional Numerical Weather Prediction (NWP) models:

- Are based on laws of physics.
- Simulate atmospheric processes using mathematical equations.
- Model interactions among temperature, pressure, moisture, winds, and radiation.
- **Example:** High-Resolution Forecast System (HRES) of the European Centre for Medium-Range Weather Forecasts (ECMWF).

What is limiting AI from predicting weather accurately?

Structural limitations

- AI models depend heavily on historical datasets.
  - Most models were trained using weather observations from **1979–2017.**
  - Therefore, AI is effective at interpolating patterns within known ranges.
  - If a heatwave exceeds all historical records:
    - ✻ AI has no comparable past pattern.
    - ✻ Forecasts tend to underestimate intensity.
- Unprecedented climatic conditions have little or no representation in training data.

Emerging Climate Reality

- Climate change is pushing weather systems beyond historical norms.
- Future extremes are increasingly outside the range of past observations.

Conclusion:

AI is transforming weather forecasting through speed and efficiency, but extreme weather remains a domain where physical understanding still matters. The future of forecasting lies not in replacing traditional models with AI, but in combining data-driven intelligence with physics-based science to improve resilience in an era of climate extremes.

POLITY
GEOGRAPHY
ECONOMY
HISTORY
ENVIRONMENT
SCIENCE & TECHNOLOGY
NEWS
CURRENT AFFAIRS
PRELIMS
RADAR
TRACK • FOCUS • SUCCEED
NCERT
STANDARD BOOKS
NOTES
PLAN
STUDY
REVISE
PRACTICE
ANALYZE

Species in news

Why in news?

A rare **Kashmir flycatcher** was recently spotted at the **Chemmattamvayal wetlands in Kasaragod, Kerala**, indicating its migratory movement through the Indian subcontinent.

Key details of the Species:

- **Taxonomy:**
    - **Scientific name:** *Ficedula subrubra*
    - **Group:** Bird (Flycatcher)
- **Habitat:**
    - Breeds in **temperate forests**
    - Winters in **tropical forests and wooded habitats**
- **Geographical distribution:**
    - **Breeding:** Kashmir Himalayas and adjoining regions
    - **Wintering:** Mainly **Sri Lanka and southern India**
- **Conservation Status:**
    - **IUCN Red List:** Vulnerable
    - **Wildlife Protection Act, 1972:** Schedule II *(protected species; hunting restricted and punishable, though protection is lower than Schedule I species)*
    - **CITES:** Not listed

Kashmir Flycatcher

- **Threats:**
    - Habitat loss in breeding and wintering grounds
    - Forest degradation
    - Climate-related habitat changes
- **Endemism: Near-endemic to the Western Himalayas** during breeding season
- **Unique traits/ Characteristics:**
    - Small **insectivorous migratory bird**
    - Males show **orange throat and breast** with dark upperparts
    - Captures insects through short aerial flights ("flycatching")
- **Migration Significance:** Migrates from Himalayan breeding grounds to southern India/Sri Lanka during winter.

Conocarpus Species

Why in news?

Ecologists have raised concerns over the widespread planting of **Conocarpus** along **highways and road medians** in Tamil Nadu, citing ecological and environmental risks associated with the species.

Key details of the Species:

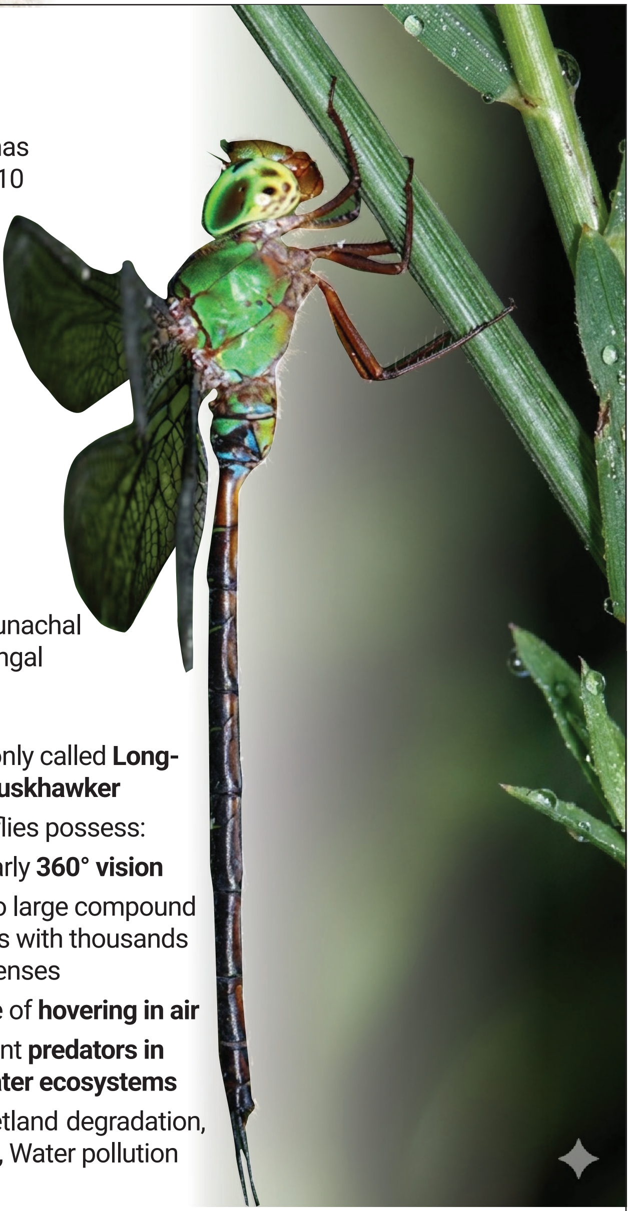
- **Taxonomy:**
    - **Scientific name:** *Conocarpus erectus*
    - **Common names:** Conocarpus / Buttonwood
    - **Group:** Plant (Shrub/Tree)
- **Habitat:**
    - Naturally found in **coastal and mangrove-associated ecosystems**
    - Adapted to **saline and dry conditions**
- **Geographical distribution:**
    - Native to coastal and tropical regions of Africa, Arabian Peninsula, and parts of South Asia.
    - Introduced and widely planted in India and Gulf countries
- **Ecological Concerns:**
    - **High water uptake** may affect nearby vegetation and groundwater
    - **Dense root system** can damage pavements, drainage systems, and underground pipelines
    - **Reduces space for native plant species** affecting **local ecological balance and**

urban biodiversity.
  - Provides relatively **low ecological value for native biodiversity**
  - Concerns over **pollen-related allergies** in some regions
  - Can spread aggressively under favourable conditions **outcompeting native vegetation.**
- **Endemism: Not endemic to India** (introduced species)
- **Unique traits/Characteristics:**
  - Fast-growing and drought-resistant ornamental tree species
  - Tolerates **high salinity and pollution**
  - Widely used in **urban landscaping, roadside plantations,** and **decorative greenery.**

Long-tailed Duskhawker

Why in news?

The rare dragonfly called the **Long-tailed Duskhawker**, has been rediscovered in **Arunachal Pradesh,** after nearly 110 years since it was last recorded in 1914. The species was recorded from Namdapha National Park and Tiger Reserve.

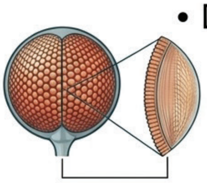


Key details of the species:

- **Taxonomy:**
  - **Scientific name:** *Gynacantha khasiaca*
  - **Group:** Insect (Dragonfly)
  - **Order:** Odonata
- **Habitat:** Freshwater ecosystems near forest streams, wetlands, and marshy habitats
- **Geographical distribution:** Recorded from Arunachal Pradesh, Assam, Meghalaya, Uttarakhand, West Bengal
- **Ecological role:**
  - Indicators of **freshwater ecosystem health**
  - Help control insect populations
- **Endemism:** Not endemic to India
- **Conservation Status:**
  - **IUCN:** Not Evaluated
  - **Wildlife Protection Act, 1972:** Not specifically listed
  - **CITES:** Not listed
- **Unique traits/Characteristics:**
  - Commonly called **Long-tailed Duskhawker**
  - Dragonflies possess:
    - ✻ **Nearly 360° vision**
    - ✻ Two large compound eyes with thousands of lenses
  - Capable of **hovering in air**
  - Important **predators in freshwater ecosystems**
- **Threats:** Wetland degradation, Habitat loss, Water pollution

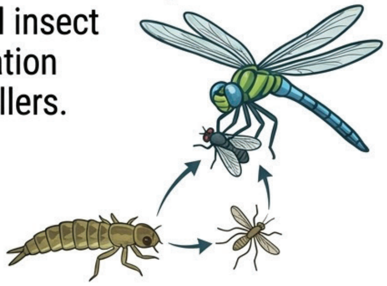
Key facts about Dragon Flies

- Dragonflies are **predatory** insects belonging to **Order Odonata.**



- Dragonflies possess **compound eyes** made of thousands of tiny lenses called **ommatidia.** This provides:
  - near-360° vision,
  - high motion sensitivity.

- **Ecological importance of dragonflies:** They are the **Bioindicators:**
  - Dragonflies are highly sensitive to:
    - * water pollution,
    - * habitat degradation,
    - * wetland disturbances.
  - Hence, their presence often **indicates healthy freshwater ecosystems.**
  - They act as predators in aquatic food webs, and natural insect population controllers.



Nagaland Cascade Frog

Why in news?

Scientists from the Zoological Survey of India (ZSI) have recorded a new cascade-dwelling frog species, ***Amolops kamal***, from the **hill-stream habitats of Nagaland's Kiphire district** near the India–Myanmar border.

What are Cascade frogs?

- Stream-dwelling frogs that are generally found near fast-flowing hill streams and waterfalls.
- **Characteristics of hill stream habitats:**
  - oxygen-rich water,
  - rocky substrates,
  - high moisture,
  - specialised biodiversity

Key details about the frog:

- **Taxonomy:**
  - **Scientific name:** *Amolops kamal*
  - **Common name:** Nagaland Cascade Frog
  - **Group:** Amphibian (Frog)
- **Habitat:**
  - **Hill-stream ecosystems**
  - Rocky, fast-flowing stream habitats in mountainous regions
- **Geographical distribution:**
  - Recorded from **Kiphire district, Nagaland**
  - Northeastern Himalayan/Indo-Myanmar biodiversity region
- **Endemism:** Currently known only from **Nagaland region**
- **Conservation Status:**
  - **IUCN:** Not Evaluated
  - **Wildlife Protection Act, 1972:** Not specifically listed
  - **CITES:** Not listed
- **Unique traits/Characteristics:**
  - Belongs to the **cascade frog genus (*Amolops*)**
  - Adapted to:
    - ✻ Fast-flowing streams
    - ✻ Rugged mountainous terrain
  - Cascade frogs generally possess strong limbs and adhesive adaptations for clinging to wet rocks

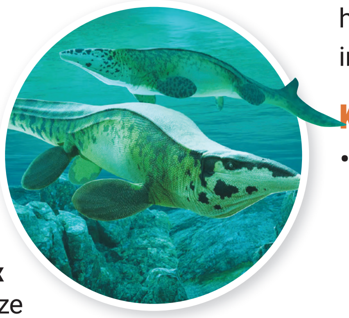
THREATS:

Habitat disturbance in hill-stream ecosystems Deforestation

Climate change affecting stream ecology

Tylosaurus Rex

Why in news?



Researchers have identified ***Tylosaurus rex*** as a distinct species of giant marine reptile that lived during the Late Cretaceous period, earning the nickname **"T. rex of the Sea"** because of its size and predatory capabilities.

Key features:

- **Taxonomy:**
    - **Scientific name:** *Tylosaurus rex*
    - **Group:** Mosasaur (Extinct marine reptile)
- **Geological period:**
    - **Late Cretaceous Period**
    - Approximately **80 million years ago**
- **Habitat:** Lived in the **Western Interior Seaway**, a vast inland sea that once divided North America
- **Geographical distribution:** Fossils mainly found in Kansas, Texas, and other parts of North America.
- **Unique traits/Characteristics:**
    - One of the **largest mosasaurs**
    - Streamlined body adapted for marine hunting
    - Long snout with large serrated teeth
    - Four paddle-like flippers
    - Powerful tail for propulsion
    - Apex predator of ancient seas
- **Taxonomic significance:**
    - Belongs to the group **Mosasauria**
    - Earlier specimens were often classified as ***Tylosaurus proriger***
    - Recent anatomical studies identified ***Tylosaurus rex*** as a separate species
- **Evolutionary significance:**
    - Mosasaurs evolved from **land-dwelling lizards**
    - Modern monitor lizards, including the **Komodo Dragon**, are considered among their closest living relatives

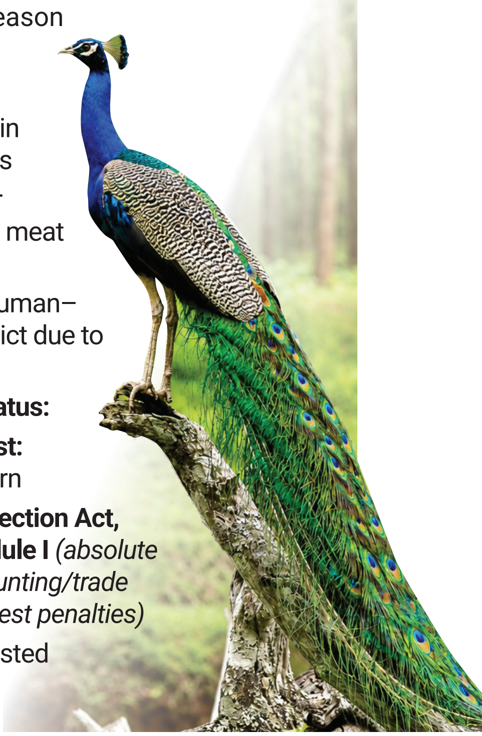
Indian Peafowl (Peacock)

Why in news?

The growing population of **Indian peafowl** in the **Kuppam region of Andhra Pradesh** has led to increasing concerns over **crop damage**, highlighting emerging human–wildlife conflict involving the country's national bird.

Key details about Indian Peafowl:

- **Taxonomy:**
    - **Scientific name:** *Pavo cristatus*
    - **Common name:** Indian Peafowl / Peacock (male), **Peahen** (female)
    - **Group:** Bird (Family: Phasianidae)
- **National Bird of India** (declared in 1963).
- **Habitat:**
    - Open forests, scrublands and agricultural landscapes
    - Frequently found near human settlements and cultivated fields
- **Geographical distribution:**
    - Native to the **Indian subcontinent**
    - Widely distributed across India, Sri Lanka and parts of Nepal
- **Endemism: Native to the Indian subcontinent** (not endemic to India alone)
- **Unique traits/Characteristics:**
    - Males possess an elaborate **iridescent tail** train used in courtship displays
    - **Omnivorous**; feeds on seeds, insects, fruits, reptiles and small animals
    - Strong cultural and religious significance in India
    - Known for loud calls, especially during the monsoon season
- **Threats:**
    - Habitat degradation in some regions
    - Poaching for feathers and meat (historically)
    - Increasing human–wildlife conflict due to crop raiding
- **Conservation Status:**
    - **IUCN Red List:** Least Concern
    - **Wildlife Protection Act, 1972: Schedule I** *(absolute protection; hunting/trade banned; highest penalties)*
    - **CITES:** Not listed



Places in news

Kumbhalgarh Fort

Why in news?

The **wall of Kumbhalgarh Fort is considered the second-longest continuous wall in the world after the Great Wall of China**, drawing attention to its historical and architectural significance.

Key details about Kumbhalgarh Fort:

- **Location:** Rajsamand district, **Rajasthan**
- **Built by: Rana Kumbha** of the Sisodia dynasty
- **Period:** 15th century
- **Mountain range: Aravalli Hills**
- **UNESCO status:** Part of the **Hill Forts of Rajasthan** World Heritage Site
- **Fort wall:**
  - Extends over **36 km**
  - Popularly called the **"Great Wall of India"**
- **Historical significance:**
  - Birthplace of **Maharana Pratap**
  - Important defensive fort of Mewar kingdom

Padma Barrage

Why in news?

Bangladesh approved the Padma Barrage Project on the **Padma River** (Bangladesh stretch of the Ganga) to address water scarcity and improve irrigation in the country's drought-prone southwest region.

Key details about Padma Barrage:

- **River: Padma River** (main distributary of the Ganga in Bangladesh)
- After entering Bangladesh, the Ganga is known as Padma.
  - The Ganga is a transboundary river.
    - ✻ A **transboundary river** flows across more than one country.
    - ✻ **E.g.:** Ganga, Brahmaputra, Indus.
- **Location:** Rajbari district, Bangladesh
- **Project features:**
  - Large barrage with spillway gates, navigation locks, and fish passages
  - Intended for irrigation, water storage, and hydropower generation
- **Purpose:**
  - Improve dry-season water availability
  - Support agriculture and regional water security
- **Concerns:**
  - Ecological impacts on river flow and fisheries
  - Sedimentation and waterlogging risks
  - Padma = Ganga in Bangladesh

Barrage vs Dam

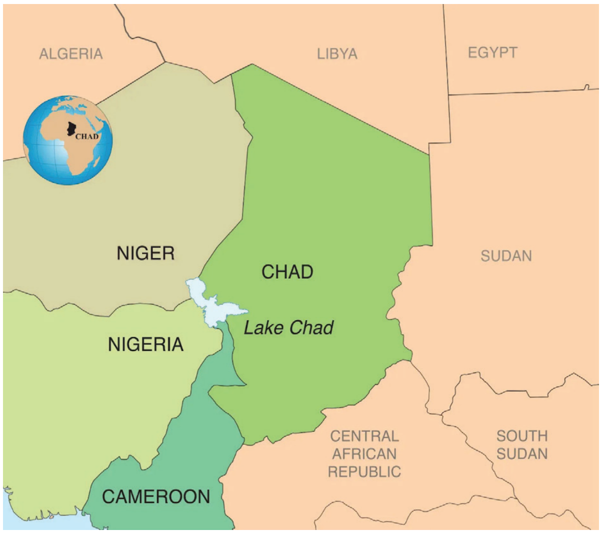
Barrage	Dam
Primarily regulates/diverts flow	Stores large volumes of water
Usually has gates/ spillways	Creates large reservoir
Lower water storage	Higher storage capacity
Often used for irrigation/ navigation	Multipurpose storage & power generation

CHINA
arlung Zangbo (Tsangpo)
Lhasa
Subansiri
Lohit
Kathmandu
BHUTAN
Brahmaputra
ndak
Kosi
Ganges
Teesta
Guwahati
Patna
Surma
Farakka
BANGLADESH
Jamuna
Barak
Dhaka
Damodar
Hooghly
Padma
Meghna
Kolkata
Mouths of the Ganges
MYANMAR
Bay of Bengal

Lake Chad Basin

Why in news?

A recent counter-terrorism operation against **ISWAP (Islamic State West Africa Province)** has drawn attention to the security situation in the **Lake Chad Basin**, where militant groups operate across porous international borders.


ALGERIA
LIBYA
EGYPT
CHAD
NIGER
CHAD
SUDAN
Lake Chad
NIGERIA
CENTRAL AFRICAN REPUBLIC
SOUTH SUDAN
CAMEROON

Key details of the lake chad basin:

- **Location:** Central Africa
- **Centred around:** Lake Chad
- **Shared by:** Nigeria, Niger, Chad, and Cameroon
- **Significance:**
  - o Supports millions through fishing, farming, and pastoralism
  - o Important transboundary freshwater ecosystem
- **Challenges:**
  - o Shrinking lake area due to climate variability and water extraction
  - o Cross-border insurgency and terrorism
- **Institutional mechanism:** Managed through the **Lake Chad Basin Commission (LCBC)**

Gilgit-Baltistan

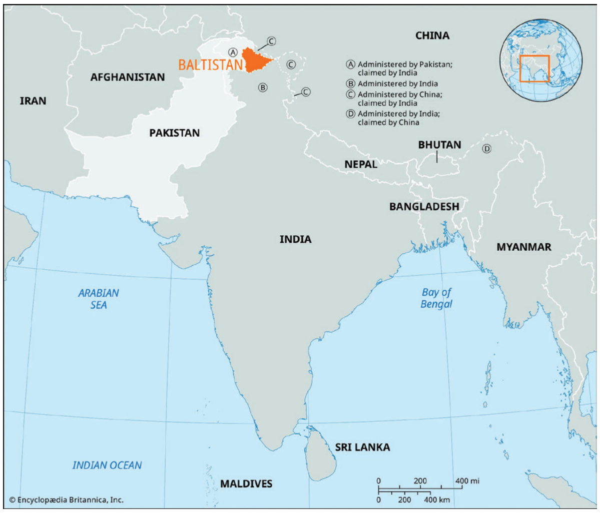
Why in news?

India has lodged a strong protest against Pakistan's decision to hold **"General Elections" in Gilgit-Baltistan**, reiterating that the region is an integral part of the Union Territory of Ladakh and remains under Pakistan's illegal occupation.

Key details of Gilgit-Baltistan:

- **Location:** Northernmost part of the Kashmir region
- **Administrative control:** Administered by Pakistan
- **Claim:** Claimed by India as part of the erstwhile princely state of Jammu & Kashmir
- **Borders:**
  - o Ladakh (India) to the east
  - o Khyber Pakhtunkhwa (Pakistan) to the west
  - o Xinjiang (China) to the north
- **Major mountain ranges:** Karakoram, Himalayas, and Hindu Kush
- **Strategic significance:**
  - o Hosts a section of the **China–Pakistan Economic Corridor (CPEC)**

  - Contains the **Karakoram Highway**
  - Gateway to several high-altitude passes and glaciers


CHINA
Ⓐ
Ⓒ
BALTISTAN
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AFGHANISTAN
Ⓑ
Ⓒ
IRAN
Ⓐ Administered by Pakistan; claimed by India
Ⓑ Administered by India
Ⓒ Administered by China; claimed by India
Ⓓ Administered by India; claimed by China
PAKISTAN
BHUTAN
Ⓓ
NEPAL
BANGLADESH
INDIA
MYANMAR
ARABIAN SEA
Bay of Bengal
SRI LANKA
INDIAN OCEAN
MALDIVES
0 200 400 mi
0 200 400 km
© Encyclopædia Britannica, Inc.

Beaufort Castle

Why in news?

Beaufort Castle has emerged as a strategic flashpoint amid the ongoing Israel–Hezbollah conflict in southern Lebanon.

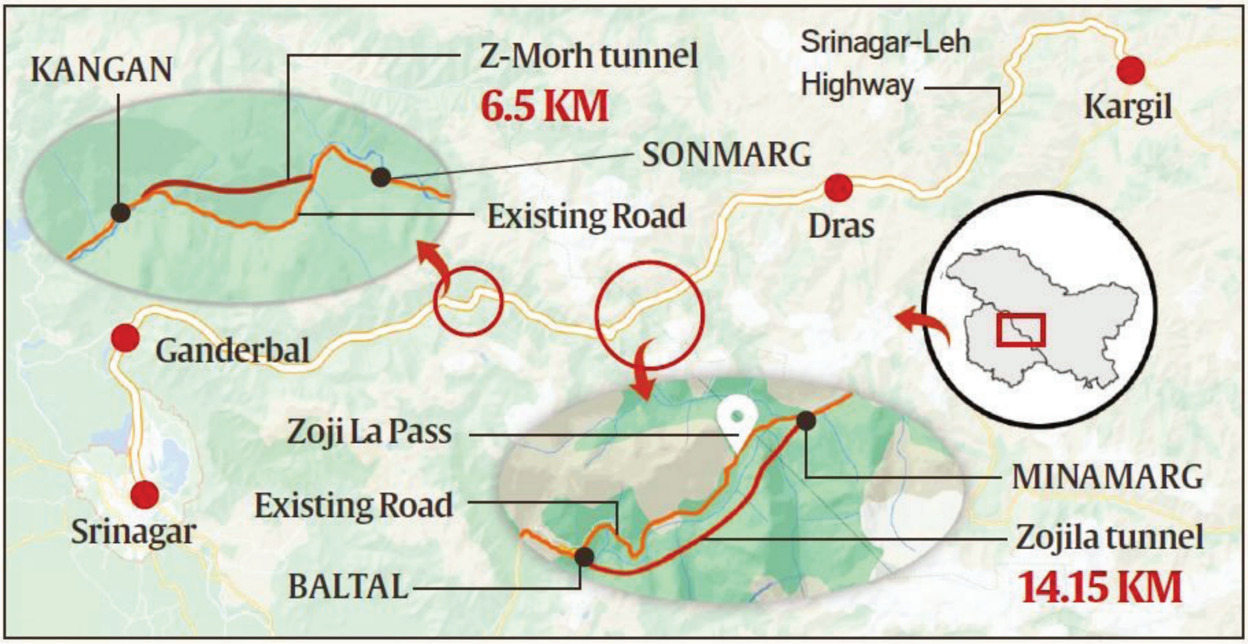
Key details about the castle:

- **Location:** Southern **Lebanon**, near the **Litani River**
- **Original name: Qalaat al-Shaqif** ("Castle of the High Rock")
- **Built:** 12th century by Crusaders
- **Elevation:** Situated on a hilltop with extensive views of southern Lebanon and northern Israel.
- **Historical control:** Held at different times by Crusaders, Ayyubids, Mamluks, Ottomans, and modern military forces.
- **Strategic importance:**
  - Natural defensive position
  - Used for surveillance and military operations due to its location
- **Heritage status:**
  - Included on Lebanon's UNESCO World Heritage Site Tentative List
  - Received enhanced protection under the **1954 Hague Convention** in 2024.

Zojila Tunnel

Why in news?

The **Zojila Tunnel**, connecting **Kashmir Valley (Ganderbal)** with **Kargil (Ladakh)**, achieved its **final breakthrough** on June 9, 2026, marking a major milestone in one of India's most strategic infrastructure projects.


KANGAN
Z-Morh tunnel
6.5 KM
Srinagar-Leh Highway
Kargil
SONMARG
Existing Road
Dras
Ganderbal
Zoji La Pass
MINAMARG
Existing Road
Srinagar
Zojila tunnel
BALTAL
14.15 KM

Key details of Zojila tunnel:

- **Location:**
  - Located beneath the **Zojila Pass** in the western Himalayas.
  - Connects **Sonamarg (Kashmir)** with **Drass–Kargil (Ladakh)**.
  - Lies on **National Highway-1 (NH-1)**, the lifeline connecting Srinagar with Leh.
- **Length:** 13.14 km
- **Altitude:** Around **11,578 feet**
- **Type:** Single-tube, bi-directional, two-lane road tunnel
- **Tunnel Approach Road:** About 7.57 km
- **Executing Agency:** Megha Engineering & Infrastructures Limited (MEIL)
- **Cost:** More than ₹6,800 crore
- **World's longest single-tube bi-directional road tunnel** at such a high altitude.

Significance:

- **All-weather Connectivity**
  - Provides year-round connectivity between Kashmir and Ladakh.
  - Bypasses the snow-bound **Zojila Pass**, which remains closed during winters due to heavy snowfall and avalanches.
- **Strategic Importance**
  - Facilitates movement of troops, equipment, fuel and supplies to forward areas along the **Line of Actual Control (LAC)**.
  - Strengthens India's border infrastructure in Ladakh.
- **Economic Benefits**
  - Boosts tourism in Ladakh and Kashmir.
  - Improves trade and transport of goods.
  - Enhances regional integration and development.
- **Disaster Resilience:** Reduces disruptions caused by landslides, avalanches and extreme weather conditions.

Alberta

Why in news?

The Canadian province of **Alberta** has offered its abundant and low-cost **natural gas resources** to attract investments in **AI-driven data centres**.

Key details about Alberta:

- **Location:** Western Canada
- **Capital:** Edmonton
- **Largest city:** Calgary
- **Economic significance:**
  - Canada's leading producer of **oil and natural gas**
  - Contains major portions of the **Western Canadian Sedimentary Basin**
- **Physical features:**
  - Rocky Mountains in the west
  - Prairies in the east
- **Energy importance:**
  - Hosts vast oil sands deposits
  - Major contributor to Canada's energy exports

Angkor Thom

Why in news?

Archaeologists have discovered an **ancient royal water management system beneath Angkor Thom**, shedding new light on the hydraulic engineering and urban planning of the Khmer Empire.

Key details of Angkor Thom:

- **Location:** Near Siem Reap, **Cambodia**
- **Founded by:** King **Jayavarman VII**
- **Period:** Late 12th century CE
- **Meaning:** “Great City”
- **Historical significance:**
  - Last and most enduring capital of the **Khmer Empire** known for its advanced urban planning and hydraulic engineering.
  - Enclosed by massive walls and a moat
- **Famous monuments within the city: Bayon Temple,** Baphuon, and Terrace of the Elephants.
- **Engineering significance:** Part of the sophisticated **Angkor hydraulic system**, involving reservoirs, canals, and water-control structures

Awards / Recognition in news

Padma Awards (2026)

Why in news?

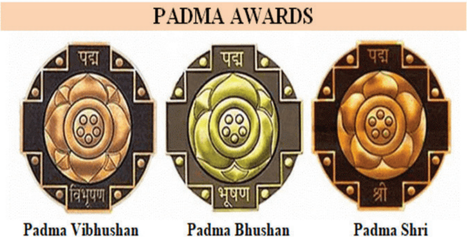
President Droupadi Murmu conferred the **Padma Awards 2026** at the Civil Investiture Ceremony held at Rashtrapati Bhavan, New Delhi.

> ***Civil Investiture Ceremony*** is a formal ceremony in which civilian honours are officially conferred by the President of India at Rashtrapati Bhavan.

What are Padma Awards?

- **India's highest civilian honours after Bharat Ratna**.
- Instituted in **1954**.
- They recognise **distinguished service** in various fields involving **public service**.
- The awards will be formally presented by the **President of India** at **Rashtrapati Bhavan**.
- **Categories (order of precedence):**
    - o Padma Vibhushan – For exceptional and distinguished service
    - o Padma Bhushan – For distinguished service of a high order
    - o Padma Shri – For distinguished service

Bharat Ratna



- **Recipient fields:**
    - o Awardees come from diverse fields, including **art, literature, science, medicine, social work, public affairs, sports, trade and industry, and civil service**.
    - o They are also awarded for contributions to:
        - ✻ Propagation of Indian culture

    - Protection of human rights
    - Wildlife and environmental conservation, etc.
- **Eligibility:**
  - **All persons are eligible**, irrespective of gender, religion, race, occupation or position.
  - **Government servants are generally not eligible**.
  - **Exception:** Doctors and scientists working in government service **are eligible**.
  - The award is for **"special service"**, not merely **long service** or **Seniority alone.**
  - **Key features:**
  - Padma Awards **do not carry any cash reward**.
  - Awardees receive
    - A **Sanad (certificate)** signed by the President
    - A **medallion**, which may be worn at **public and government functions**.
  - The awards **cannot be used as titles** or as prefixes or suffixes to names.
  - A Padma awardee is **generally eligible for a higher category after 5 years** *(this is a guideline and can be relaxed)*.
  - **Maximum 120 awards** can be given in a year to persons residing in India.
    - This limit **does not include** NRIs, foreigners, or posthumous awards.
  - Padma Awards are **generally not given posthumously**, but may be awarded in **exceptional cases**.
  - Awards were **not announced** in 1978, 1979, and 1993–1997
- **People who refused such awards:**
  - Maulana Abul Kalam Azad **opposed the idea** of awards for sitting ministers, but he was **posthumously awarded** the Bharat Ratna in **1992.**
  - C. Rajagopalachari (initial hesitation)
  - Mother Teresa (initially declined Padma Shri)
  - Buddhadeb Bhattacharjee, former chief minister of West Bengal, refused **Padma Bhushan (2011).**

- Padma Awards Committee is constituted **annually** by the Prime Minister of India.
- Recommendations are submitted to:
  - Prime Minister,
  - and subsequently approved by the President of India.
- Recommendations can be made by State Governments, Union Territories, Ministries, Governors, Chief Ministers, Members of Parliament, and private individuals.

Important Personalities who won the Award

Personality	Contribution
N. Rajam	Hindustani classical violin; known for **"Gayaki Ang"** style
Dharmendra	Indian cinema
Harmanpreet Kaur	Women's cricket
Prosenjit Chatterjee	Indian cinema
Baldev Singh	Indian hockey
Taga Ram Bheel	Folk music
K. Vijay Kumar	Internal security/public service

*****Gayaki Ang*** is a musical technique in which instrumental music imitates the nuances of human vocal music.

Panchayat Advancement Index

Why in news?

The **Panchayat Advancement Index (PAI)**, an initiative of the **Ministry of Panchayati Raj**, has received the **Gold Award** at the **National Awards for e-Governance 2026** under the category **"Digital Transformation through the Use of Data Analytics in Digital Platforms."**

What is the Panchayat Advancement Index (PAI)?

- India's **first comprehensive data-driven framework** for assessing the performance of **Gram Panchayats**.
- Developed by the **Ministry of Panchayati Raj**.
- Measures progress under the **Localisation of**

Sustainable Development Goals (LSDGs).

- Aims to promote:
  - Evidence-based governance
  - Performance benchmarking
  - Outcome-oriented rural development

About the National Awards for e-Governance

- Conferred annually to recognise excellence in **e-Governance initiatives** across India.
- Organised under the aegis of the **Department of Administrative Reforms and Public Grievances**.
- The Gold Award includes:
  - Trophy
  - Citation
  - Cash incentive of **₹10 lakh**

PAI 2.0: Key Features

- Covers over **2.6 lakh Gram Panchayats** across the country.
- Assesses performance using:
  - **150 indicators**
  - **230 data points**
- Evaluates Gram Panchayats across **nine themes of LSDGs**.
- Based on composite scores, Gram Panchayats are classified into **five performance categories**.

LSDGs aim to integrate the **Sustainable Development Goals (SDGs)** into local planning and governance by empowering Panchayati Raj Institutions to implement and monitor development outcomes at the grassroots level.

Order of the White Double Cross (First Class)

Why in news?

Prime Minister **Narendra Modi** was conferred the **Order of the White Double Cross (First Class)**, the highest state honour of **Slovakia**, by President **Peter Pellegrini**.

Key about the award:

- It is the **highest national honour of Slovakia**.
- Conferred by the **President of Slovakia**.
- Awarded to: Slovak citizens, Foreign nationals
- Recognises exceptional contributions to:
  - Development of bilateral relations
  - International cooperation
  - Promotion of Slovakia's interests abroad
  - Outstanding public and diplomatic service
- **Symbolism:** Named after the **Double Cross**, a prominent national symbol appearing in the **coat of arms of Slovakia**.
  - Reflects Slovakia's historical and cultural heritage.
- **Significance:**
  - Symbolises the growing partnership between **India and Slovakia**.
  - Recognises contributions towards strengthening bilateral cooperation and people-to-people ties.

State Honours Conferred on Prime Minister Narendra Modi (2026)

Country	Highest State Honour Conferred
Slovakia	Order of the White Double Cross, First Class
Dominica	Dominica Award of Honour
Guyana	Order of Excellence
Barbados	Honorary Freedom of Barbados

Institutions/ Organisations in news

Indian

Indian Association for the cultivation of science (IACS)

Why in news?

IACS celebrated its **150th anniversary** in Kolkata, where the government inaugurated an indigenous solar-cell fabrication facility and the **RETINA incubation centre**.

Key details about IACS:

- **Established**: 1876
- **Founder**: Dr. Mahendralal Sircar
- **Location**: Kolkata
- Considered the **first modern scientific research institution in India and Asia established by Indians**
- **Historical significance:**
  - C. V. Raman conducted research here leading to the discovery of the **Raman Effect.**
  - Linked to India's **first Nobel Prize in Science (1930).**
  - Associated with scientists like Jagadish Chandra Bose, Meghnad Saha, and S. N. Bose.
- **Significance:**
  - Symbol of India's scientific heritage and innovation
  - Supports frontier research and technology development
  - Promotes integration of research with startups and industry
- **Recent developments:**
  - Indigenous **PECVD system** for amorphous silicon solar cells
  - Launch of **RETINA incubation centre** for research entrepreneurship and innovation.

Group of Seven (G7)

Why in news?

G7
FRANCE
ÉVIAN

Prime Minister Narendra Modi attended the **G7 Summit in Evian, France**.

What is G7?

- An informal grouping of major advanced economies.
- Established in **1975** as the G6; Canada joined in 1976 to make it G7.
- Functions as a platform for discussing global economic and geopolitical issues.
- **Members:** Canada, France, Germany, Italy, Japan, United Kingdom, and United States
- The **European Union** participates in G7 meetings but is **not counted as a member country**.
- **Nature:**
  - Informal forum (not established by a treaty).
  - No permanent secretariat.
  - No headquarters.
  - Presidency rotates annually among members.
- **Objective:**
  - Promote global economic stability
  - Coordinate responses to international crises
  - Discuss trade, energy, climate, and security issues
  - Strengthen cooperation among advanced economies
- India is **not a member** of G7. India is frequently invited as an **outreach partner** to participate in summit discussions.
- Russia was part of the G8 but was suspended in 2014.

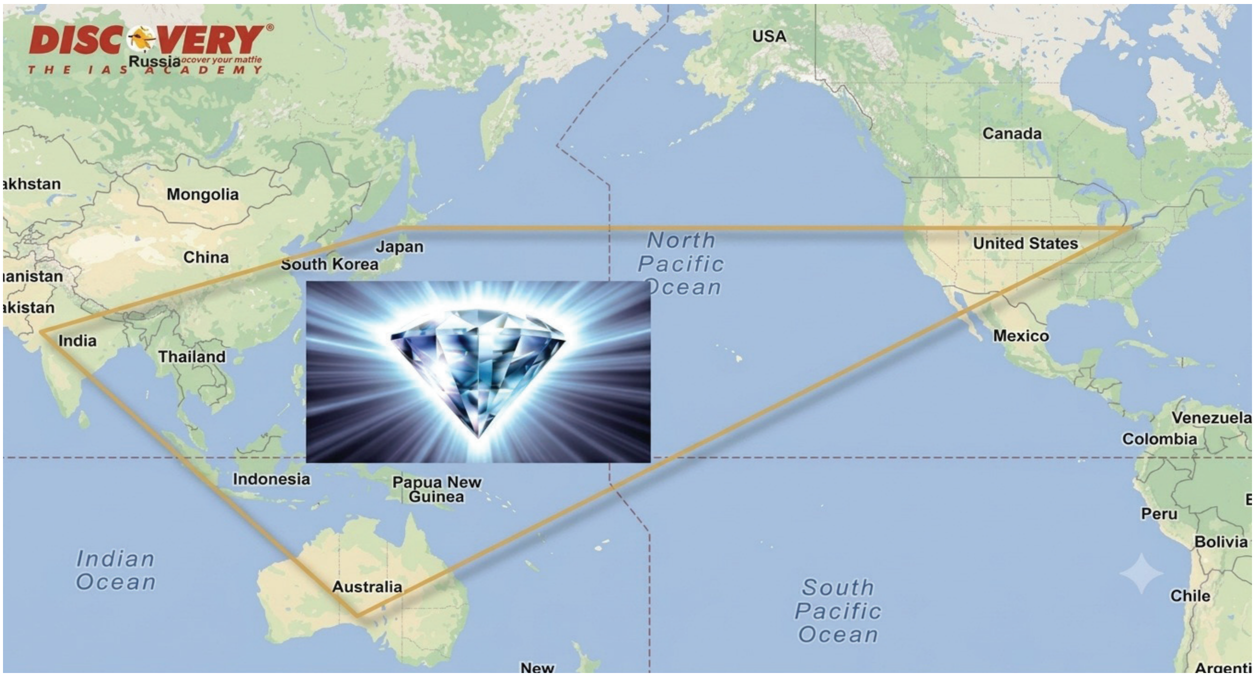
Asian Productivity Organisation

Why in news?

India is hosting the **68th Session of the APO Governing Body Meeting** in New Delhi as the Chair of the Asian Productivity Organization (APO).

What is APO?

- An **intergovernmental organisation** established in **1961**
- Focuses on improving **productivity and competitiveness** in the Asia-Pacific region
- Comprises **21 member economies**
- **Objective:** To promote,
    - Productivity enhancement
    - Sustainable socioeconomic development
    - Technical cooperation and knowledge sharing
- **Functions:**
    - Conducts policy dialogue and capacity building
    - Shares best practices in productivity improvement
    - Supports innovation, industrial efficiency, and skill development
    - Promotes cooperation among member economies
- Its **Governing Body (GB)** is the highest decision-making body of APO that meets annually and decides on:
    - Strategic direction
    - Budget and governance reforms
    - Institutional priorities
- **India's Role:** India is the **Chair of APO (2025–26),** represented through,
    - Department for Promotion of Industry and Internal Trade (DPIIT)
    - National Productivity Council (NPC)
- **Significance:**
    - Supports productivity-led economic growth
    - Encourages regional cooperation in technology and innovation
    - Helps improve industrial competitiveness and governance


DISCOVERY THE IAS ACADEMY
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South Korea
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India
Thailand
Mexico
Venezuela
Colombia
Indonesia
Papua New Guinea
Peru
Bolivia
Indian Ocean
Australia
South Pacific Ocean
Chile
New
Argenti

QUAD

Why in news?

External Affairs Minister **S. Jaishankar** hosted the landmark **QUAD Foreign Ministers' Meeting (QFMM)** at Hyderabad House in New Delhi, where members reaffirmed their commitment to a **free, open, inclusive, and rules-based Indo-Pacific**.

What is Quadrilateral Security Dialogue (Quad)?

- An informal strategic multilateral grouping of India, USA, Japan and Australia
- **Guiding principle:** "free, open, inclusive and prosperous" Indo-Pacific region
- Initially formed in 2007 but revived in 2017.
- **Why it is formed?**
    - o To explore Indo-Pacific oceans potential
    - o To curtail China's growing influence in the region
- **Key features:**
    - o Not a military alliance
    - o No mutual defence treaty
    - o Functions through summits, ministerial meetings, and working groups
- **What are its objectives?** To,
    - o Foster free, open, rules-based order in Indo-Pacific region
    - o Share critical technologies
    - o Ensure supply chain resilience
    - o Develop Infrastructure and connectivity projects

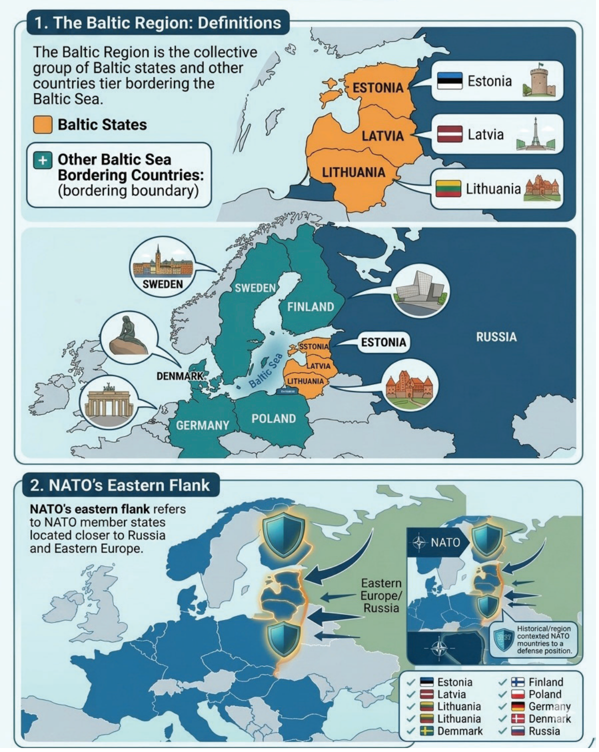
Why is it important?

- It is an opportunity for like-minded countries to collaborate on projects of mutual interest
- It provides a platform to discuss common global issues like terrorism, climate change etc.
- Involvement of U.S. and Japan will provide finances for developmental projects
- Creates alternatives to critical areas like semiconductors in which China is a leader

NATO Baltic Tactical Command Centre (1GNC)

Why in news?

Germany and the Netherlands have decided to establish a **joint NATO tactical headquarters in the Baltic region**.


1. The Baltic Region: Definitions

The Baltic Region is the collective group of Baltic states and other countries tier bordering the Baltic Sea.

2. NATO's Eastern Flank

NATO's eastern flank refers to NATO member states located closer to Russia and Eastern Europe.

Historical/region contexted NATO mountries to a defense position.
Baltic States
Other Baltic Sea Bordering Countries: (bordering boundary)
ESTONIA
LATVIA
LITHUANIA
Estonia
Latvia
Lithuania
SWEDEN
SWEDEN
FINLAND
SSTONIA
ESTONIA
RUSSIA
LATVIA
LITHUANIA
Baltic Sea
DENMARK
GERMANY
POLAND
NATO
Eastern Europe/ Russia
✓ Estonia
✓ Latvia
✓ Lithuania
✓ Lithuania
✓ Demmark
✓ Finland
✓ Poland
✓ Germany
✓ Denmark
✓ Russia

- The Baltic region includes Baltic states, **+** all other countries that physically border the **Baltic Sea**.
- **Baltic States:** Estonia, Latvia, and Lithuania.
- **Other Countries in the Baltic Region:** Sweden, Finland, Poland, Germany, Denmark, and Russia.

NATO's eastern flank refers to member states located closer to Russia and Eastern Europe.

What is the new NATO Baltic Command Centre?

- The new command centre is called **1GNC (First German-Netherlands Corps)**
- It is a joint German–Dutch tactical headquarters that will assume a command role on NATO's eastern flank, particularly in Estonia and Latvia.
- The headquarters is expected to become operational in the Baltics within the year.
- **Objective:** To strengthen NATO's eastern flank and improve military coordination.
- **Functions:** The command centre can control up to **50,000 troops if required.** Its responsibilities include:
  - Planning military operations
  - Conducting military exercises
  - Preparing for possible conflict scenarios
  - Leading forces during wartime situations
- The German-Netherlands Corps is headquartered in **Münster, Germany.** From there, it deploys personnel for NATO missions whenever required.
- At present, NATO forces in the Baltic region are coordinated through a single headquarters located in **Szczecin, Poland**
- The new tactical headquarters is expected to strengthen operational coordination in the Baltic theatre.

Why is NATO establishing this centre?

- **Security concerns in Eastern Europe:** The move comes amid,
  - Rising tensions with Russia
  - NATO's efforts to strengthen deterrence capabilities
  - Growing emphasis on rapid military coordination in the Baltic region
- **Strengthening NATO's eastern flank:** The deployment aims to,
  - Improve cohesion within NATO
  - Enhance operational readiness
  - Strengthen military deterrence in the Baltics

Bonn Climate Change Conference

Why in news?

The **64th Session of the UNFCCC Subsidiary Bodies (SB64)** was held in Bonn, Germany.

What is the Bonn Climate Change Conference?

- An annual climate conference held in **Bonn, Germany**

UNFCCC
SB64 BONN 2026
From Ambition to Action

- Organised under the **United Nations Framework Convention on Climate Change (UNFCCC)**
- Serves as an **inter-sessional meeting** between two annual COP summits
- **Objective:** To advance technical and political negotiations on:
  - Climate mitigation
  - Climate adaptation
  - Climate finance
  - Loss and damage
  - Transparency and implementation of climate commitments
- **Key Bodies Involved:** The conference brings together the two permanent subsidiary bodies of the UNFCCC:

Body	Function
Subsidiary Body for Implementation (SBI)	Reviews implementation of climate agreements
Subsidiary Body for Scientific and Technological Advice (SBSTA)	Provides scientific and technical guidance

- **Key Features:**
  - Hosted by the **UNFCCC Secretariat** headquartered in Bonn
  - Attended by government negotiators, experts, civil society groups, and international organisations.
  - Helps prepare agendas and draft outcomes for COP meetings

Key Issues at Bonn 2026

- Global Goal on Adaptation (GGA)
- Climate finance for developing countries
- Just Transition Work Programme
- Global Stocktake follow-up
- Future of the Sharm el-Sheikh Mitigation Work Programme
- Impact of unilateral trade measures such as the EU's Carbon Border Adjustment Mechanism (CBAM)
- The health organizations urged developed countries to **triple adaptation finance to $120 billion annually by 2035**.

Why is it important?

- Acts as a bridge between successive COP conferences
- Facilitates negotiations on unresolved climate issues
- Plays a key role in discussions on climate finance and adaptation support for developing countries

India's Position at Bonn 2026

- Called for implementation of **Paris Agreement commitments** on climate finance.
- Emphasised the **widening adaptation finance gap**.
- Supported positions of:
  - **G77 and China**
  - **Like-Minded Developing Countries (LMDC)**
  - **BASIC group (Brazil, South Africa, India, China)**
- Raised concerns regarding climate-related trade barriers such as CBAM.

International Labour Conference

Why in news?

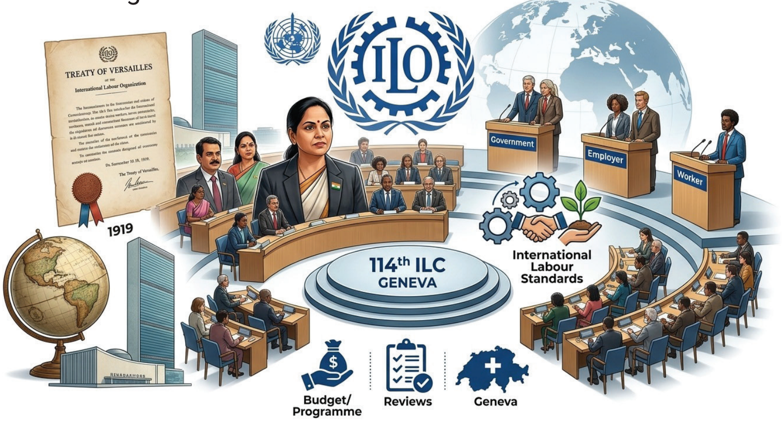
Union Minister of State for Labour and Employment **Shobha Karandlaje** led the Indian delegation at the **114th International Labour Conference (ILC)** held in Geneva, Switzerland.

What is the International Labour Conference?

- The highest decision-making body of the **International Labour Organization (ILO)**
- Often referred to as the "**World Parliament of Labour**"
- Held annually in **Geneva, Switzerland**
- **Composition:**
  - o Each member state is represented by:
    - ✻ Two government delegates
    - ✻ One employers' delegate
    - ✻ One workers' delegate
  - o This reflects the ILO's **tripartite structure**.
- **Key functions:**
  - o Adopts International Labour Standards (Conventions and Recommendations)
  - o Discusses global labour and employment issues
  - o Approves the ILO programme and budget
  - o Reviews implementation of labour standards by member countries

International Labour Organisation

- Established in **1919** under the Treaty of Versailles
- Became the first specialized agency of the UN in **1946**
- Headquarters: **Geneva, Switzerland**
- Unique **tripartite structure** involving governments, employers, and workers



Reports,Rankings, Indices in news

Sample Registration System Bulletin 2024

Why in news?

The **Registrar General of India** released the **Sample Registration System (SRS) Bulletin 2024**.

- ***Sample Registration System (SRS)*** is India's largest demographic survey system.
- Conducted by the **Office of the Registrar General of India (RGI)** under the **Ministry of Home Affairs**.
- Provides annual demographic and health indicators.
- Provides estimates on birth rate, death rate, infant Mortality Rate (IMR), fertility and mortality indicators.

Changing trends

India's birth rate, death rate and infant mortality rate have fallen over the last decade, though vast rural-urban gaps and uneven progress persist

Indicator	2014	2024	Difference
Birth rate	21	18.3*	Down by 2.7 points
Death rate	6.7	6.4**	Down by 0.3 points
Infant mortality rate	39	24#	Down by 15 points

■ Kerala has a single-digit IMR of 8, the lowest in the country

*Births per population of 1,000

**Deaths per population of 1,000

Infant deaths per 1,000 live births

Source: SRS Bulletin 2024

Key insights from the trends:

- Declining birth rate, death rate and IMR indicate India's ongoing **demographic transition**.
- **Kerala** recorded the **lowest IMR (single digit: 8)**.
- **Rural - Urban Trends:**
  - o Urban areas performed better than rural areas:
    - ✻ Urban birth rate fell faster
    - ✻ Urban IMR reduced from **26** to **17**
  - o Rural areas still lag behind in health outcomes.
- Indicates improvement in Maternal & child healthcare and Public health services

WMO Global Climate Projections Report

Why in news?

The **World Meteorological Organization (WMO)** released new climate projections warning that global temperatures are likely to reach record highs in the next five years.

What is the report about?

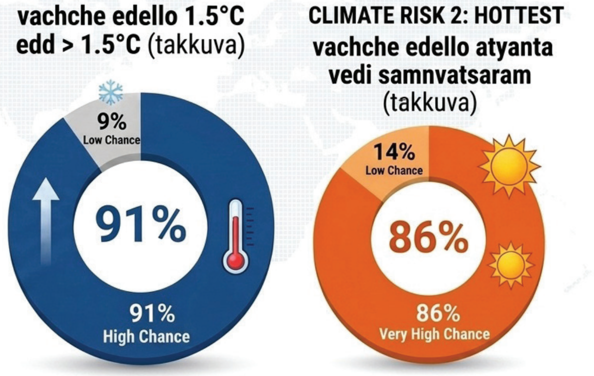
- Provides short-term projections of Global temperature rise, extreme weather trends, and Climate risks.

राष्ट्रीय परिवार स्वास्थ्य सर्वेक्षण-6 (NFHS-6) :
आपके परिवार की स्वास्थ्य,
हमारी जिम्मेदारी
NFHS-6

- Prepared with support from the **UK Met Office** and other climate centres.

Key insights from the report:

- There is:
  - **91% chance** that at least one of the next five years will exceed **1.5°C warming** above pre-industrial levels.
  - **86% chance** that one of the next five years will become the **hottest year on record**.



- Average global temperatures during **2026–2030** are projected to remain **1.3°C to 1.9°C above pre-industrial levels**.
- Arctic warming is expected to occur at a much faster rate than the global average.
- **Key concerns highlighted in the report:**
  - **Heatwaves** are more frequent and intense
  - Accelerated **Glacier Melting** contributes to sea-level rise and freshwater disruption
  - Rising ocean temperatures lead to **coral bleaching.**
  - Higher warming may intensify **amazon drought risk, forest fires** and **ecosystem degradation.**

- Crossing the **1.5°C threshold temporarily** does not mean the Paris Agreement has permanently failed.
- However, every additional **0.1°C rise increases climate risks significantly**.

Mega Science Vision-2035: Climate Research

Why in news?

The report ***Mega Science Vision-2035: Climate Research*** warned that India is gradually losing its capability to develop indigenous scientific instruments.

What is the report about?

- It is part of the broader **Mega Science Vision (MSV)** initiative which gives a long-term scientific roadmap prepared by **India's research community** to identify major scientific priorities till 2035
- It focuses on strengthening climate research through indigenous technologies, advanced observation systems, scientific instrumentation and long-term climate monitoring capabilities.

Key insights from the report:

- India's climate research majorly **depends on imported scientific instruments**, many of which remain poorly calibrated.
- Inaccurate/**poor-quality observational data** can affect the **credibility of Indian scientific research**.
- **Lowest-cost procurement systems** discourage development of high-quality indigenous instruments.
- The report recommends developing an **indigenous Earth System Model** suited to Indian conditions.
- It proposes **mega projects** involving satellites, observatories, field campaigns and in-situ monitoring networks.
- The report calls for studies on the **long-term environmental impact of large-scale renewable energy expansion.**
- It also advocates estimating the **social cost of carbon** and strengthening the **"polluter pays"** principle.

ICAN & SIPRI Reports on Global Nuclear Weapons Spending

Why in news?

Recent reports by the **International Campaign to Abolish Nuclear Weapons (ICAN)** and the **Stockholm International Peace Research Institute (SIPRI)** highlighted a sharp rise in global nuclear weapons spending and warned of a renewed nuclear arms race.

Key insights on global nuclear spending

- The **nine nuclear-armed states** spent about **$119 billion** on nuclear weapons in 2025.
- This represents an increase of about **19%** compared to 2024.
- Nuclear-armed countries collectively spent about **$17 billion more** than the previous year.
- **United States** is the largest spender with **$69.2 billion**
- Followed by **China:** $13.5 billion, **United Kingdom:** $12.6 billion, and **Russia:** $9.5 billion
- India is among the **nine nuclear-armed states**.

Findings of SPIRI:

- Estimated global nuclear warheads: **12,187 warheads** at the beginning of 2026.
- Warheads available for potential use: **9,745**, showing an increase in operational readiness.
- The **United States and Russia together possess around 83% of the world's nuclear arsenal.**
- China continues expanding its nuclear stockpile, estimated at around **620 warheads**.

ICAN

- Founded in **2007**.
- Global civil society coalition working towards the elimination of nuclear weapons.
- Awarded the **2017 Nobel Peace Prize**.

SIPRI

- Established in **1966**.
- Headquarters: **Stockholm, Sweden**.
- Independent institute conducting research on:
    - Conflict
    - Armaments
    - Arms control
    - International security.
- **9-Nuclear armed states recognised by SIPRI:** United States, Russia, United Kingdom, France, China, India, Pakistan, Israel *(undeclared but widely acknowledged nuclear power), and* North Korea.

Category	Countries
NPT-recognized Nuclear Weapon States (P5)	United States, Russia, United Kingdom, France, China
Nuclear-armed states outside NPT	India, Pakistan, Israel
Withdrew from NPT and developed nuclear weapons	North Korea

Reuters Digital News Report 2025

Why in news?

The **15th Reuters Institute Digital News Report** highlights a major shift in global news consumption patterns.

How are people consuming news today?

According to the Reuters report:

- Social media and video platforms such as **Facebook, Instagram, TikTok, and YouTube** have become the primary gateways for news consumption.
- A growing proportion of people now use these platforms as their **main source of news**, a trend especially visible among younger audiences.
- Online news videos have become increasingly popular, with **77% of respondents** consuming online news videos every week.
- News consumption is increasingly occurring on **third-party platforms** rather than directly through news websites and apps.
- Around **10% of respondents globally** reported using **AI chatbots** to access news, particularly people below 35 years of age.

What is driving this change?

- Changing audience consumption habits and declining engagement with traditional news formats.
- Greater preference for video-based and platform-based content.
- Younger generations are less likely to develop traditional news habits such as newspaper reading.
- Older audiences are increasingly adopting the digital consumption patterns of younger users.
- Growing availability and convenience of AI-powered tools for accessing information.

Planetary Vital Signs Report (2026)

Why in news?

A new scientific paper, released during the **Bonn Climate Conference**, warned that the Earth's "**planetary vital signs**" have deteriorated at an unprecedented pace since the last major UN climate assessment.

What is the study about?

- A global scientific assessment tracking key indicators of the Earth's climate system.

- Evaluates changes in:
  - Greenhouse gas concentrations
  - Global temperature
  - Ocean heat content
  - Sea-level rise
  - Glacier and ice-sheet loss
  - Energy imbalance of the Earth
- Updates scientific evidence since the IPCC's Sixth Assessment Report (AR6).

Key insights from the report:

- Several climate indicators have reached **record levels**.
- Atmospheric concentrations of Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O) continue to rise.
- Global average temperature is approaching the **1.5°C threshold** above pre-industrial levels.
- Oceans have recorded:
  - Record heat content
  - Increased marine heatwaves
- Global mean sea level continues to rise due to:
  - Thermal expansion of oceans
  - Melting glaciers and ice sheets.
- **Major concerns:**
  - Climate change impacts are accelerating faster than anticipated.
  - Increased frequency of heatwaves, floods, droughts, and wildfires
  - Remaining **global carbon budget** for limiting warming to 1.5°C is shrinking rapidly.

UNICEF Children's Climate Risk Report 2026

Why in news?

The **United Nations Children's Fund (UNICEF)** released the **Children's Climate Risk Report 2026**, assessing children's exposure to climate and environmental risks worldwide.

What is the Report?

- A global assessment of how climate change affects children.
- Uses the **Children's Climate Risk Index (CCRI)** to measure:
  - Children's exposure to climate hazards.
  - Access to essential services and resilience systems.
- Identifies countries where children face the greatest climate-related risks.

Key insights from the report:

- Nearly **1 billion children** live in countries facing **extremely high climate risk**.
- Climate change is increasingly affecting Health, Nutrition, Education, Water security, and Child protection
- Major climate threats include:
  - Heatwaves
  - Floods
  - Droughts
  - Cyclones
  - Air pollution
  - Water scarcity
- Children are more vulnerable than adults because:
  - Their bodies and immune systems are still developing.
  - They depend heavily on social and public services.
- **India specific findings:**
  - India remains among the countries where large numbers of children are exposed to:
    - Extreme heat
    - Floods
    - Water stress
    - Air pollution
  - Climate shocks can affect school attendance, nutrition outcomes, and access to healthcare.

Key recommendations:

- Strengthen **climate-resilient schools, health systems, and water infrastructure**.
- Increase investment in:
  - Child-centred climate adaptation
  - Early warning systems
  - Disaster preparedness
- Integrate children's needs into national climate policies.

Committees/Commissions in news

High-Level Committee on Demographic Changes

Why in news?

The Government constituted the **High-Level Committee on Demographic Changes (HLCDC)** to study demographic changes and their implications across different regions of India.

Demography is the statistical study of the human population. It includes analysis of:
- population size,
- population distribution,
- migration,
- birth rates,
- death rates,
- age structure,
- and population composition.

About HLCDC:

- A high-level committee constituted by the **Ministry of Home Affairs**
- Headed by retired Supreme Court judge **Justice Prakash Prabhakar Naolekar**
- It is **not a constitutional/statutory body**
- **Objective:** To examine,
  - Demographic changes in different regions of India
  - Impact of migration and population shifts
  - Effects on governance, public services, and social cohesion
- **Key focus areas:**
  - Urban centres and industrial corridors
  - Border and tribal regions
  - Resource distribution and local governance
  - Illegal migration and demographic balance
- **Key mandate:**
  - Study demographic trends and migration patterns
  - Recommend a system for:
    - Identification of illegal migrants
    - Detention and deportation mechanisms
  - Suggest policy measures for demographic management

Defence & Space

Defence

Exercise PRAGATI 2026

Why in news?

Recently a 13-nation military exercise, **Exercise PRAGATI 2026**, concluded at the **Umroi Military Station, Meghalaya**.

Key details about the exercise:

- Hosted by the **Indian Army**.
- **Participating Countries:** Bhutan, Cambodia, Indonesia, Laos, Malaysia, Maldives, Myanmar, Nepal, Philippines, Seychelles, Sri Lanka, Vietnam, and India.
- Focused on:
    - **Counter-insurgency operations**
    - Joint tactical drills
    - Building mutual trust among Indian Ocean region countries
- **Objective:** Provides a platform for,
    - **Professional military exchange**
    - **Interoperability**
    - **Military-to-military cooperation**
- **Significance:**
    - Strengthens India's defence engagement with **South and Southeast Asian countries**.
    - Supports India's **Act East Policy** and regional security cooperation.
    - Enhances strategic coordination in the Indo-Pacific region.

Agni-1 Ballistic Missile

Why in news?

India successfully test-fired the **Agni-1 missile** from the **Integrated Test Range, Balasore (Odisha)** under the supervision of the **Strategic Forces Command**.

Key details of the missile:

- **Type:** Short-Range Ballistic Missile (SRBM)
- Developed by **DRDO**.
- Designed for **surface-to-surface strike capability**.

- Capable of carrying **conventional and nuclear warheads**.
- Road/rail mobile missile system enhancing operational flexibility.

Significance:

- Strengthens India's **strategic deterrence capability**.
- Validates operational readiness of India's missile forces.
- Part of the **Agni series** of ballistic missiles.

Advanced Medium Combat Aircraft

Why in news?

The Ministry of Defence issued a **Request for Proposal (RFP)** to shortlisted firms for the development of the indigenous **Advanced Medium Combat Aircraft (AMCA)** programme.

What is AMCA?

- India's **indigenous fifth-generation stealth fighter aircraft programme** being developed to strengthen:
  - advanced combat capability,
  - aerospace self-reliance,
  - and next-generation air power.
- **Being Developed by:** Aeronautical Development Agency (ADA) under the Ministry of Defence.
- **Key features:**
  - **Stealth capability** with reduced radar signature
  - Advanced avionics and sensor systems
  - **Supercruise capability** (supersonic flight without afterburners)
  - Designed to meet long-term r quirements of the **Indian Air Force**
- **Programme structure:**
  - The government plans to develop **five AMCA prototypes**.
  - Development will occur through **industry partnership models** involving Indian private sector firms.
  - Selected private firms will work with Aeronautical Development Agency (ADA).
- **Significance:**
  - Strengthens India's **indigenous aerospace capability**.
  - Reduces dependence on foreign fighter aircraft.
  - Major boost to **Aatmanirbhar Bharat in defence manufacturing**.

- ***Stealth technology*** is the technique used to reduce detection of aircraft by radar, infrared, sonar or other detection systems. It helps:
  - improve survivability,
  - avoid enemy radar systems,
  - and enhance strategic strike capability.
- ***Avionics*** are electronic systems used in aircraft including navigation, communication, radar, flight control, and weapons systems.
- ***Supercruise*** refers to the ability of an aircraft to fly at supersonic speeds without using fuel-intensive afterburners.

India - Singapore Defence Policy Dialogue

Why in news?

India and **Singapore** held the **16th Defence Policy Dialogue** in Singapore

INDIA
Bay of Bengal
South China Sea
MALAYSIA
SINGAPORE
Indian Ocean
INDONESIA

What is India-Singapore Defence Policy dialogue?

- A high-level bilateral mechanism for defence cooperation, military engagements, strategic coordination, defence industry collaboration, and regional security discussions.

Key areas of cooperation:

- **Artificial Intelligence (AI)** in defence applications
- **Cybersecurity collaboration**
  - Maritime and naval cooperation
  - Defence technology and capacity building
  - Unmanned systems

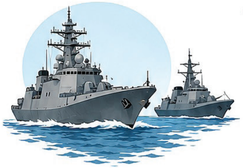
Why is Singapore important for India?

Strait of Malacca

- Singapore lies near the **Strait of Malacca,** one of the world's most important maritime chokepoints.

- A significant portion of global trade, energy transportation, and India's maritime commerce passes through this region.

- India and Singapore elevated ties to **Comprehensive Strategic Partnership (CSP)**, covering defence, trade, technology, digital cooperation, and regional security.



- **Singapore-India Maritime Bilateral Exercise (SIMBEX)** is one of India's longest-running naval exercises which focuses on maritime interoperability, naval coordination, anti-submarine warfare, and maritime security.

Significance:

- Strengthens India–Singapore strategic partnership in the Indo-Pacific.
- Enhances cooperation in **emerging defence technologies**.
- Supports regional stability and secure maritime navigation.

BrahMos Missile

Why in news?

India has signed a deal to export **BrahMos missile** to **Vietnam**, while a similar agreement with **Indonesia** is in advanced stages.

Why are Vietnam & Indonesia important to India?

- Both are ASEAN member nations and are strategically important in:
  - South China Sea region (Vietnam is South China Sea claimant state),
  - Indo-Pacific maritime security.
- Indonesia is the **largest ASEAN economy.**

About BrahMos:

- A **supersonic cruise missile** jointly developed by India and Russia.
  - A cruise missile is a **guided missile that flies within the atmosphere** toward a target using continuous propulsion.
  - **Characteristics:**
    - relatively low-altitude flight,
    - precision targeting,
    - manoeuvrability.
- Developed by **BrahMos Aerospace**.
- Can be launched from **land, sea, air, and submarine platforms**
- **Key features:**
  - Travels at **supersonic speed (~Mach 2.8–3)**
    - Supersonic refers to **speeds greater than the speed of sound** (Mach 1).
  - **Precision-strike capability** against land and naval targets
  - **Among the world's fastest** operational cruise missiles.

Strategic significance of this deal:

- Expands India's **defence exports footprint** in Southeast Asia.
- Strengthens India's role in the **Indo-Pacific security architecture**.
- Supports **Act East Policy,** defence diplomacy, and Aatmanirbhar Bharat in defence manufacturing.

Cruise Missile vs Ballistic Missile

Cruise Missile	Ballistic Missile
Flies within atmosphere	Travels partly outside atmosphere
Continuous propulsion	Propelled mainly in initial phase
Guided throughout flight	Follows ballistic trajectory
High precision	Long-range strategic use

Project Udayak

Why in news?

The Border Roads Organisation (BRO) celebrated the 37th Raising Day of **Project UDAYAK** at Doomdooma, Assam.

Border Roads Organisation (BRO)

- Established in **1960**
- Functions under the **Ministry of Defence** to develop and maintain road infrastructure in India's border and strategically important areas.
- It **executes projects in difficult terrains** including the Himalayas, deserts, forests, and high-altitude regions.

Key details about Project Udayak:

- A **major infrastructure project** under the Border Roads Organisation responsible for construction and maintenance of strategic roads and related infrastructure in eastern Arunachal Pradesh and adjoining Assam.
- **Area of responsibility:** Manages more than **1,457 km of road network** across strategically important districts of Arunachal Pradesh: Anjaw, Lohit, Dibang Valley, Longding, Tirap, and Changlang.
- These regions are located near:
  - the **Line of Actual Control (LAC)** with China, and
  - the **Indo–Myanmar border**.
- **Major functions:**
  - Construction and maintenance of strategic roads.
  - Development of border fencing infrastructure along the Indo–Myanmar border.
  - Enhancing military logistics and troop mobility.
  - Improving connectivity in remote and difficult terrain.
  - Supporting socio-economic integration of border communities

RudraM-II Missile

Why in news?

The **DRDO** and the **Indian Air Force** successfully conducted flight trials of the indigenous **RudraM-II missile**.

- An **air-to-surface missile** is a missile launched from aircraft to strike targets on land or sea.
- Targets may include: radar stations, bunkers, communication systems, and air defence infrastructure.

What is RudraM-II?

- An indigenous **air-to-surface missile**.
- Developed by **Research Centre Imarat (RCI), Hyderabad** under DRDO.
- **Key features:**
  - Developed for **precision strikes** against **enemy ground targets.**
  - It is launched from **airborne fighter platforms.**
  - Trials validated: Flight performance, Guidance systems, and Critical subsystems
  - **Development partners:** Supported by,
    - **Hindustan Aeronautics Limited**
    - DRDO laboratories
    - Indian defence industries
- **Significance:**
  - Enhances India's **precision strike capability**.
  - Strengthens indigenous defence technology and self-reliance.
  - Supports **Aatmanirbhar Bharat** in advanced missile systems.

C-295 Transport Aircraft

Why in news?

The **first India-manufactured Airbus C-295** successfully completed its maiden test flight from the **Tata Advanced Systems Limited (TASL)-Airbus facility in Vadodara, Gujarat**.

About C-295 Programme

- Being manufactured in India under a partnership between **Airbus** and **Tata Advanced Systems Limited**.
- Part of a contract to supply **56 C-295 aircraft** to the **Indian Air Force**.
- First **16 aircraft** are supplied in fly-away condition from Spain, while the remaining **40 are to be manufactured in India**.

Key Features

- **Medium tactical transport aircraft**.
- Intended to replace the ageing **Avro-748 transport aircraft** fleet of the Indian Air Force.
- Capable of operating from **short and unprepared airstrips**.
- Can perform:
  - Troop and cargo transport
  - Medical evacuation
  - Humanitarian assistance and disaster relief (HADR)
  - Special operations missions

Significance

- First military aircraft to be manufactured in India by the private sector on such a scale.
- Major boost to **Aatmanirbhar Bharat** and indigenous aerospace manufacturing.
- Expected to strengthen India's defence industrial ecosystem and aviation supply chain.

Ballistic Missile Defence (BMD)

Why in news?

The **DRDO** successfully conducted three flight tests demonstrating:

- A **multi-layered Ballistic Missile Defence (BMD) system**, and
- The **NASM-MR**.

What is a BMD System?

- A multi-layered missile shield designed to detect, track and intercept incoming ballistic missiles.
- Uses **interceptor missiles** to destroy hostile missiles before they reach their targets.
- **Significance:**
  - Places India among a select group of countries possessing indigenous BMD capability.
  - Strengthens protection against missile threats, including long-range ballistic missiles.

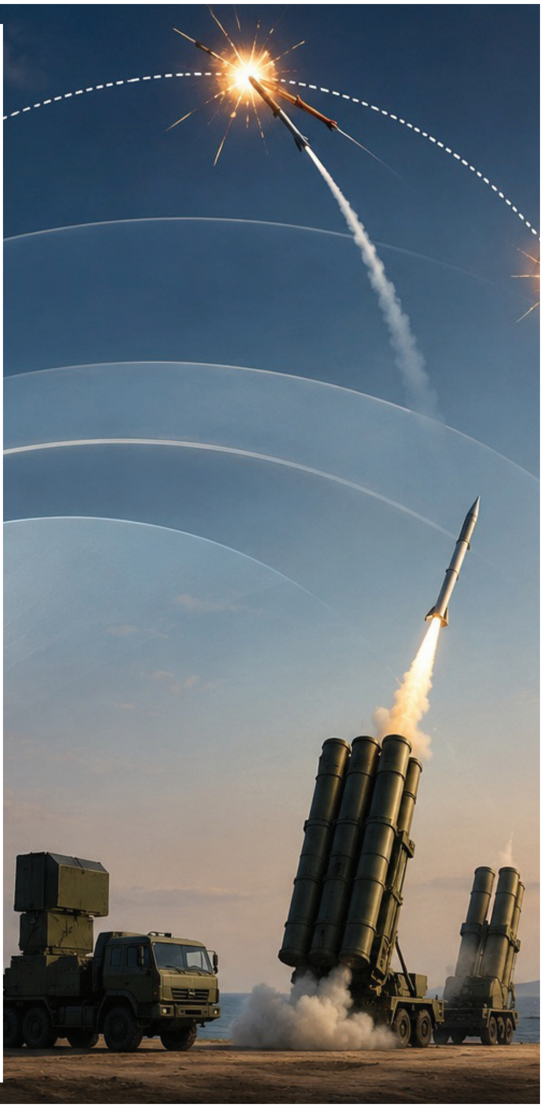
NASM-MR (Naval Anti-Ship Missile – Medium Range)

Key Features:

- Indigenous **medium-range anti-ship missile**.
- Designed to engage and destroy hostile naval targets.
- Enhances the Indian Navy's maritime strike capability.

Significance:

- Improves sea-denial and maritime warfare capabilities.
- Strengthens indigenous precision-strike systems.



Space

Gaganyaan's Environmental Control and Life Support System

Why in news?

The **Gaganyaan** mission's **Environmental Control and Life Support System (ECLSS)** has gained attention for its role in sustaining astronauts in space.

What is ECLSS?

- A system that recreates **Earth-like living conditions inside a spacecraft**.
- Maintains:
  - Air quality
  - Oxygen supply
  - Temperature & humidity
  - Water supply
  - Waste management
- **Significance:**
  - Essential for **human survival in space missions**.
  - Critical for India's goal of achieving **indigenous human spaceflight capability**.
  - Forms the backbone of future **long-duration space missions**.

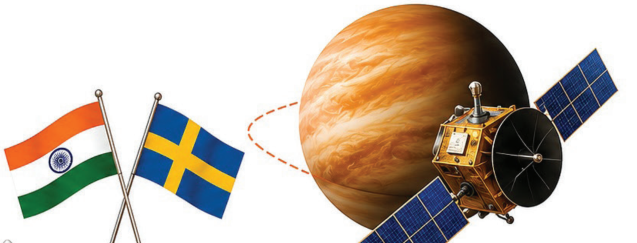
Key features:

- **Air Revitalisation**
  - Removes **carbon dioxide** from cabin air.
  - Supplies oxygen and filters contaminants.
- **Pressure & Temperature Control**
  - Maintains safe cabin pressure and comfortable temperature.
  - Uses cooling systems and humidity

control units.

- **Water Management:** Stores and supplies potable water in microgravity conditions.
- **Waste Management:**
    - Uses suction-based systems for collection of liquid and solid waste.
    - Prevents microbial growth and toxic gas build-up.
- **Fire Safety:** Smoke detectors and water-mist fire suppression systems used in emergencies.

Shukrayaan Mission



Why in news?

Sweden has joined India's proposed Shukrayaan mission to Venus during Prime Minister Narendra Modi's visit, expanding international collaboration in planetary exploration.

What is Shukrayaan?

- Proposed Venus exploration mission by ISRO.
- **Aims to study:**
    - Venusian atmosphere
    - Surface characteristics
    - Geological activity
    - Atmospheric chemistry

Key objectives:

- Understand the runaway greenhouse effect on Venus.
- Study the thick carbon dioxide atmosphere and sulphuric acid clouds.
- Investigate possible volcanic and tectonic activity.
- Examine interaction between solar radiation and atmosphere.

Significance:

- Strengthens India's deep-space exploration capability.
- Expands international cooperation in planetary science.
- Helps comparative study of Earth and Venus climate evolution.

GRAPES-3 (Gamma Ray Astronomy PeV EnergieS – Phase 3)

Why in news?

Researchers using the **GRAPES-3** observatory developed a method to monitor changes in Earth's upper atmosphere in real time by analysing **22 years of muon data**.

What is GRAPES-3?

- A **cosmic-ray observatory** located at **Ooty, Tamil Nadu**.
- Equipped with one of the world's largest **muon telescopes** (its main instrument) for studying cosmic rays, solar activity, and atmospheric phenomena.
- Studies **cosmic rays** and their interaction with Earth's atmosphere.
- Operated through collaboration between Indian and Japanese researchers.

How does it work?

- Detects **muons**, subatomic particles produced when cosmic rays collide with Earth's atmosphere.
- Consists of **16 detector modules** spread over a large area.
- Uses proportional counters filled with a gas mixture to record passing muons.

Schemes in news

BHAVYA Scheme

Why in news?

The Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce & Industry, released operational guidelines for the **BHAVYA Scheme**, a Central Sector Scheme aimed at developing world-class industrial parks across India.

Key details of the Scheme:

- A **Central Sector Scheme** designed to develop **investment-ready**, integrated, and globally **competitive industrial parks** to strengthen India's manufacturing ecosystem.
- The scheme aligns with Make in India, PM Gati Shakti, logistics integration, and India's manufacturing-led growth strategy.
- **Nodal Ministry:** Ministry of Commerce & Industry
- **Implementing agency:** DPIIT
    - **National Industrial Corridor Development Corporation (NICDC)** has been designated as **Project Management Agency (PMA)** for implementation, monitoring, and coordination.
    - Projects will be implemented through **Special Purpose Vehicles (SPVs)** incorporated under the **Companies Act, 2013.**
- **Time period:** 2026-27 to 2031-32
- **Total Outlay:** Rs. 33,660 Crore
- **Industrial Parks Planned:** 100
- **Key objectives:**
    - Develop globally benchmarked industrial infrastructure
    - Promote manufacturing competitiveness
    - Strengthen domestic supply chains
    - Enhance integration with Global Value Chains (GVCs)
    - Attract large-scale investments
    - Generate employment opportunities
    - Improve multimodal industrial connectivity
- **Focus areas:** The scheme aims to create **"Investment-ready industrial ecosystems"** with,
    - **Plug-and-play infrastructure** (Ready-to-use industrial infrastructure)
    - Multimodal logistics connectivity
    - Reliable utility systems
    - Worker-support infrastructure

  - Digital governance systems
  - Sustainable industrial infrastructure
- The scheme permits development of **both greenfield industrial parks and eligible brownfield** industrial parks.
  - **Greenfield Project:** Developed from scratch on undeveloped land
  - **Brownfield Project:** Expansion/ modernisation of existing industrial infrastructure
- **Minimum Land Requirements for Industrial Parks:**
  - **Non-hilly states:** 100 acres
  - **Hilly/Northeastern States, UTs, Smaller States:** 25 acres
  - **Maximum Consideration:** Up to 100 acres
- Industrial parks will be selected through a **challenge-based competitive framework**.
- The scheme incorporates **GIS-based monitoring systems**, audit mechanisms, and periodic progress reporting for transparency and implementation oversight.

SARTHAK Public Distribution System

Why in news?

The Cabinet Committee on Economic Affairs (CCEA) has approved the **SARTHAK Public Distribution System (SARTHAK-PDS)** scheme with an outlay of **₹25,530 crore for five years** to strengthen food security and modernise the Public Distribution System (PDS).

Why is this reform being made?

- India's Public Distribution System is **one of the world's largest food-security networks**.
- Under NFSA, subsidised foodgrains are distributed to eligible households through Fair Price Shops (FPS).

FAIR PRICE SHOP
PUBLIC DISTRIBUTION SYSTEM
SMART PDS
STRONGER INDIA
SARTHAK-PDS SCHEME
GOOD FOOD. BETTER FUTURE.

- **Structural problems of traditional PDS system:**
  - diversion and leakages,
  - ghost beneficiaries,
  - weak grievance redressal,
  - delays in transportation,
  - poor tracking of foodgrain movement,
  - and inefficiencies in last-mile delivery.
- As food subsidy expenditure remains substantial, improving delivery efficiency has become important for both welfare outcomes, and fiscal management.
- Thus, the **focus of reform has gradually shifted from merely allocating foodgrains to improving governance of foodgrain delivery** systems.

Key details of SARTHAK PDS:

- **Full Form:** Smart and Accountable Reforms for Transparent, Holistic and Knowledge-driven Public Distribution System (SARTHAK-PDS)
- **Nodal Ministry:** Ministry of Consumer Affairs Food and Public Distribution
- **Duration:** Up to **March 2031**
- **Nature:** Umbrella reform scheme for strengthening the **Public Distribution System (PDS)**
- **Objective:** To
  - Improve transparency, efficiency, security,

    and sustainability of PDS operations
  - Reduce leakages and transportation losses
- Integrates assistance to State Agencies for intra-State movement of foodgrains and FPS dealers' margin under NFSA
- SMART PDS reforms scheme covers the entire PDS value chain:
  - Beneficiary selection
  - Foodgrain movement
  - Logistics and storage
  - Grievance redressal
- It uses Artificial Intelligence (AI), Machine Learning (ML), Blockchain, and Natural Language Processing (NLP) to enable,
  - Real-time monitoring
  - Data-driven oversight
  - Citizen feedback systems
- **Institutional Support:**
  - State Command and Control Centres
  - **Citizen-centric interoperable PDS architecture.**
    - Interoperability means beneficiaries are not restricted to a single fair price shop for accessing entitlements.
    - This complements initiatives such as One Nation One Ration Card (ONORC).
    - Thus, food security is gradually moving from **location-based welfare, to portable entitlement-based welfare.**
  - ISO-certified systems for transparency and security
- **Significance:**
  - Strengthens implementation of the **National Food Security Act (NFSA)**
  - Promotes efficient and transparent food distribution
  - Supports technology-driven welfare delivery

National SC-ST Hub (NSSH) Scheme

Why in news?

The Ministry of MSME has updated the impact of the **National SC-ST Hub (NSSH) Scheme**, reporting that **public procurement from SC/ST-owned MSEs has increased nearly 37-fold, from ₹99.37 crore in 2015–16 to ₹3,738.34 crore in 2025–26**.

NATIONAL
SC-ST HUB
Safalta ki pehchaan

Key details of NSSH:

- **Launch:** October 2016
- **Nodal Ministry:** Ministry of Micro Small and Medium Enterprises
- **Target Beneficiaries:** Scheduled Caste (SC) and Scheduled Tribe (ST) entrepreneurs operating Micro and Small Enterprises (MSEs)
- **Objective:**
  - Build the capacity of SC/ST entrepreneurs
  - Facilitate their participation in public procurement
  - Help achieve the **4% procurement target** for SC/ST-owned MSEs under the Public Procurement Policy
- **Key components:**
  - Support for purchase of:
    - Plant and machinery
    - Equipment modernization
  - Capacity building and entrepreneurship training
  - Credit facilitation
  - Market linkage support
  - Assistance for:
    - Udyam Registration
    - GeM onboarding
    - Participation in exhibitions and trade fairs

Initiatives in news

Ayush Anudan Portal

Why in news?

The **Ministry of Ayush** launched the **Ayush Anudan Portal** under the **Ayush Grid** initiative to digitise and streamline grant management in the Ayush sector.

What is Ayush Anudan Portal?

- A **digital grant management platform** developed by the Ministry of Ayush for online submission, processing, approval, and monitoring of funding proposals under various Central Sector Schemes.
- **Key features:**
  - Developed under the **Ayush Grid initiative**
  - Enables **online submission and tracking** of grant proposals
  - Integrated with the **NGO Darpan** portal for verification
  - Supports **paperless governance**
  - Includes:
    - Scheme-wise application management
    - Real-time application tracking
    - Automated verification mechanisms
  - Accessible through the **MAISP (My Ayush Integrated Services Portal)**

> ***Ayush Grid*** is a digital initiative of the Ministry of Ayush aimed at creating an integrated and citizen-centric digital ecosystem for the Ayush sector.

Samadhan Didi

Why in news?

The Union Government launched **"Samadhan Didi"**, an AI-enabled multilingual chatbot to help citizens.

What is Samadhan Didi?

- An AI-powered grievance redressal chatbot for citizens.
- Developed by the **Department of Administrative Reforms and Public Grievances (DARPG)** in collaboration with **BHASHINI**.
- **Objective:** To,
  - Improve accessibility of grievance redressal
  - Promote inclusive and citizen-centric governance
  - Simplify grievance filing process through AI

Key features of "Samadhan Didi":

- AI-enabled multilingual chatbot
- Citizens can file complaints in their **own**

language through voice or text interaction.

- Uses Artificial Intelligence and language-processing tools to identify:
    - o Ministry/Department
    - o Category and sub-category
- Integrated with the **Centralised Public Grievance Redress and Monitoring System (CPGRAMS)** ecosystem

CPGRAMS is an **online platform** for citizens to submit grievances against government departments.

- Monitored by DARPG.
- Used for grievance tracking and resolution.

BHASHINI is a government-backed AI language translation platform.

- Developed under the **National Language Translation Mission.**
- Promotes digital inclusion through Indian-language AI tools.

ESIC Centralised Online Patient Feedback System

Why in news?

The Employees' State Insurance Corporation (ESIC) has launched a **Centralised Online Patient Feedback System** across all ESIC hospitals and dispensaries nationwide

What is the Centralised Online Patient Feedback System?

- It is a technology-enabled platform that allows **Insured Persons (IPs) and beneficiaries** to provide direct feedback on healthcare services received at ESIC facilities.
- The system captures patient experiences and enables authorities to take timely corrective action.

Key features:

- **Multiple Feedback Channels:** Automated SMS link sent after availing services through the ESIC Health Information System (Dhanwantri).
    - o QR codes displayed in OPDs and hospital premises.
    - o Direct submission through the ESIC website.
- **Service Parameters Assessed**
    - o Cleanliness of healthcare facilities.
    - o Behaviour of medical staff.
    - o Availability of medicines.
- **Authenticity and Transparency Measures**
    - o OTP-based verification of beneficiaries.
    - o Prevention of duplicate feedback submissions.
    - o Multilingual support for wider accessibility.
- **Real-Time Monitoring:** Digital dashboards at ESIC Headquarters, regional offices, and local Health Facilities
    - o Ratings below 3 are automatically flagged for immediate action.
- **Institutional Accountability:** Performance ranking of healthcare facilities encourages continuous improvement and healthy competition among institutions.

Mission Senehjori

Why in news?

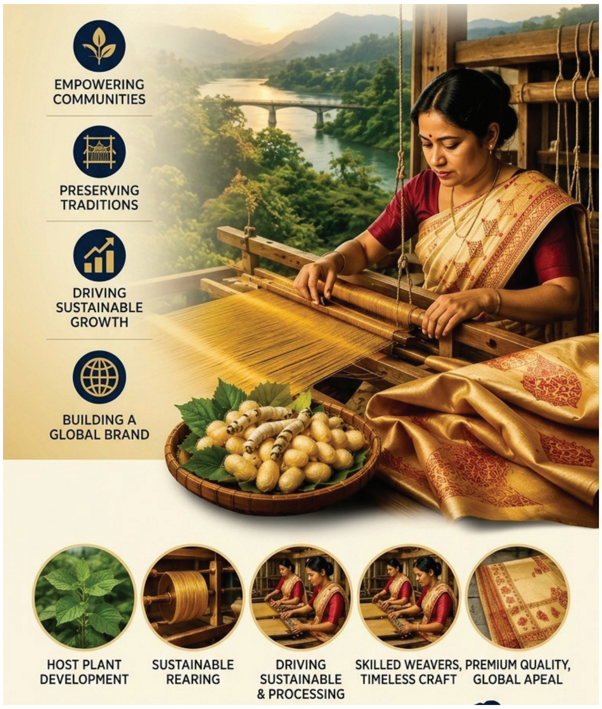
The Ministry of Development of North Eastern Region (MDoNER) launched **Mission Senehjori** to transform Assam's Muga silk sector into a globally competitive luxury textile ecosystem.

What is Mission Senehjori?

- A **cluster-based initiative** aimed at strengthening the entire **Muga silk value chain**—from cultivation and production to branding, exports, and tourism.
- It is being implemented through convergence between **MDoNER, Government of Assam, Central Silk Board, Ministry of Textiles**, and other stakeholders.
- **Objective:**
    - o Increase incomes of rearers and weavers
    - o Promote Assam as a global hub for premium Muga silk
    - o Strengthen rural livelihoods and exports
    - o Preserve the cultural heritage associated with Muga silk

About Muga Silk

- Known as the **world's only naturally golden silk**
- Produced primarily in **Assam**
- India's **first GI-tagged silk**
- Supports around **2.6 lakh rearer and weaver families**
- Renowned for its **natural golden sheen and durability**


EMPOWERING COMMUNITIES
PRESERVING TRADITIONS
DRIVING SUSTAINABLE GROWTH
BUILDING A GLOBAL BRAND
HOST PLANT DEVELOPMENT
SUSTAINABLE REARING
DRIVING SUSTAINABLE & PROCESSING
SKILLED WEAVERS, TIMELESS CRAFT
PREMIUM QUALITY, GLOBAL APEAL

Key features of the mission:

- Cluster-based development in major Muga-producing districts
- Strengthening of **Som and Soalu host plant ecology**
- Modern reeling and processing infrastructure
- Promotion of **Farmer Producer Organisations (FPOs)**
- Establishment of **Common Facility Centres (CFCs)**
- GI authentication and **digital traceability systems**
- Branding under a unified **"Senehjori"** identity
- Promotion of exports and market access

Critical Minerals Global Supply Chain Observatory

Why in news?

India and the United Kingdom launched the **Critical Minerals Global Supply Chain Observatory (CGSCO)** to strengthen cooperation in critical minerals.

What is CGSCO?

- A joint India–UK initiative for monitoring and analysing global critical mineral supply chains.
- Designed as a **data-driven platform** to assess supply risks, market trends, and supply-chain vulnerabilities.
- Jointly operated by:
  - **Technology Innovation in Exploration & Mining Foundation (TEXMiN), India**
  - Indian Institute of Technology (ISM) Dhanbad
  - University of Cambridge

Objective:

- Strengthen critical mineral supply-chain resilience.
- Promote technology sharing and research collaboration.
- Support clean energy transitions.
- Improve information-sharing on global mineral markets.
- Facilitate investment and cooperation in the critical minerals sector.

Key Uses of Critical Minerals

Mineral	Major Uses
Lithium	Batteries, EVs
Cobalt	Energy storage systems
Nickel	Battery manufacturing
Graphite	Battery anodes
Rare Earth Elements	Magnets, electronics, defence systems
Copper	Renewable energy, transmission networks

e-jagriti

Why in news?

The **e-Jagriti platform** of the **Department of Consumer Affairs** has won the **Silver Award** at the **National Awards for e-Governance (NAeG) 2026** under the category **"Government Process Re-engineering by Use of Technology for Digital Transformation."**

What is e-jagriti?

- An **AI-enabled digital platform** for consumer dispute redressal.
- Launched on **1 January 2025**.
- Developed by the **Department of Consumer Affairs**.
- Integrates four legacy consumer grievance systems into a single platform:
  - OCMS
  - e-Daakhil
  - NCDRC CMS
  - CONFONET

Key Features:

- End-to-end **paperless consumer dispute resolution**.
- Online filing of consumer complaints.
- Real-time case tracking.
- Virtual hearings through video conferencing.
- AI-powered services and chatbot support.
- Voice-to-text functionality.
- Multilingual interface.
- Accessibility features for persons with disabilities.
- Automated SMS and email notifications.
- Digital payments through Bharat Kosh, PayGov and SBI ePay.

Performance highlights

- Over **2.29 lakh** cases filed.
- More than **2.07 lakh** cases were disposed of.
- Disposal rate of **90.75%.**
- Accessible to consumers both **within India and abroad.**
- Enables **Non-Resident Indians (NRIs)** to pursue consumer cases remotely.

NZP Saathi APP

Why in news?

The Union Minister of State for Environment, Forest and Climate Change launched the **NZP Saathi App** and **self-ticketing kiosks** at the **National Zoological Park** to improve visitor experience and promote digital services.

What is NZP Saathi APP?

- A mobile application developed for visitors to the National Zoological Park, New Delhi, providing **digital navigation** and **visitor assistance** services.
- **Key features:**
    - Interactive digital zoo map
    - Smart navigation system
    - Helps locate animal enclosures, washrooms, buggy points, exits and visitor facilities.
    - Offers thematic tours: Express Tour, Family Tour, Grand Zoo Tour, and My Tour (personalised route).

Associated initiative:

Self-ticketing kiosks have also been introduced to:

- Enable online ticket booking
- Support UPI-based payments
- Provide free Wi-Fi for on-the-spot ticket purchases

250 MW Solar-BESS Project on Defence Land

Why in news?

The **Ministry of Defence (MoD)** approved the establishment of a **250 MW Solar Power Project with Battery Energy Storage System (BESS)** at **Sitapur (Uttar Pradesh)** on vacant defence land.

What is the Project about?

- **First large-scale renewable energy project on defence land** involving a **solar power plant integrated with Battery Energy Storage System (BESS)**.
- The project will be developed on about **850 acres of vacant defence land**.

Key features:

- Capacity: **250 MW Solar Power Project**
- Includes **Battery Energy Storage System (BESS)**
- Location: **Sitapur (Ex-Cantonment), Uttar Pradesh**
- Implemented by **NTPC Limited**
- Developed under MoD's initiative for **optimum utilisation of vacant defence land**
- Coordinated by:
    - Integrated HQ of MoD (Army)
    - Directorate General Defence Estates (DGDE)

BESS

Battery Energy Storage System (BESS) stores electricity generated from renewable sources and supplies it when generation is low or demand is high, ensuring a stable and reliable power supply.

India - France ATL Bridge

Why in news?

India and France have launched the **India–France ATL (Atal Tinkering Lab) Bridge** to strengthen bilateral innovation cooperation.

The **Atal Innovation Mission (AIM), NITI Aayog** and **La Fondation Dassault Systèmes** launched the **India–France ATL Bridge** to strengthen innovation collaboration between school students of the two countries.

What is the India - France ATL Bridge?

A collaborative platform that,

- Connects innovation ecosystems of India and France.
- Promotes school-level innovation and entrepreneurship.
- Facilitates cross-border innovation programmes and student exchanges.
- Enables joint problem-solving and co-creation by young innovators.
- Establishes the **first School Innovation Lab in France inspired by India's Atal Tinkering Lab model**.

Key features:

- Joint initiative of **Atal Innovation Mission (AIM), NITI Aayog** and **La Fondation Dassault Systèmes**.
    - Promotes:
        - Innovation exchanges

Oilseeds Kisan Mitra

Why in news?

The **ICAR-Indian Institute of Oilseeds Research (ICAR-IIOR)** launched **Oilseeds Kisaan Mitra**, India's first nationwide WhatsApp-based AI advisory service for oilseed farmers.

What is Oilseeds Kisan Mitra?

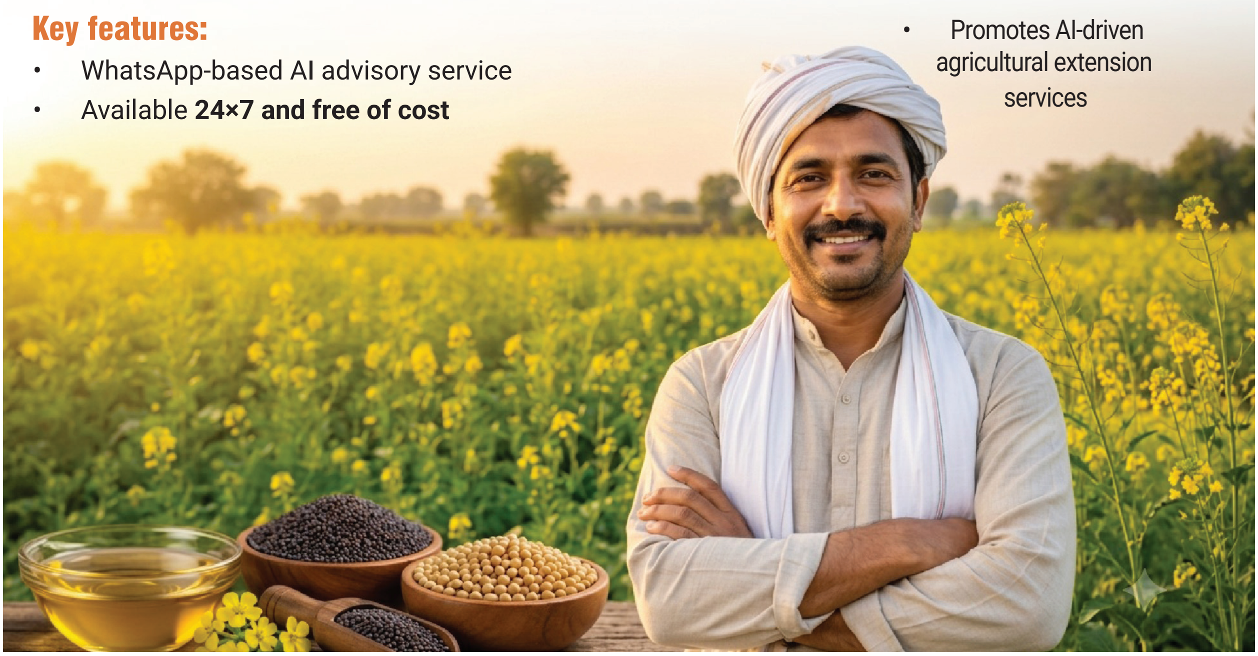
- It is a **multilingual AI-powered chatbot** that provides **24×7 research-based advisory services** to oilseed farmers through WhatsApp.
- The platform delivers instant guidance in all major Indian languages without requiring any separate mobile application.

Key features:

- WhatsApp-based AI advisory service
- Available **24×7 and free of cost**
- Supports **all Indian languages**
- Covers major oilseed crops: Groundnut, Mustard, Soybean, Sesame, Sunflower, and Niger
- Provides guidance on Variety selection, Crop management, Pest and disease control, Irrigation, Post-harvest management, and Seed availability.

Significance:

- Bridges the gap between agricultural research and farmers
- Removes barriers of language, distance, and cost
- Supports oilseed production and self-reliance in edible oils
- Promotes AI-driven agricultural extension services



  - Entrepreneurship programmes
  - Capacity building
  - Joint problem-solving activities
- Encourages collaboration among students, educators, and innovation ecosystems.
- Launched during the **India–France Year of Innovation 2026**

Atal Tinkering Labs (ATLs)

- Part of **Atal Innovation Mission**
- Launched in **2016**
- These are the innovation workspaces established in schools that provide students access to:
  - Robotics
  - Electronics
  - 3D Design and 3D Printing
  - Artificial Intelligence
  - Internet of Things (IoT)
  - Design Thinking and Problem Solving
- **Key facts:**
  - More than **10,000 ATLs** are established across India.
  - Over **11 million students** have benefited.
  - Among the world's largest school-based innovation networks.

WT-MARUT Portal

Why in news?

The Ministry of New and Renewable Energy (MNRE) launched **WT-MARUT**, India's first dedicated **Wind Turbine Supply Chain Management Portal**, during the Global Wind Day Conference in Goa.

What is WT-MARUT?

- **WT-MARUT = Wind Turbine – Manufacturing and Resource Utilisation Tracker**
- It is a digital platform developed under the aegis of the **Ministry of New and Renewable Energy** with support from the **Indian Wind Turbine Manufacturers Association**.
- It aims to strengthen India's domestic wind energy manufacturing ecosystem and improve supply chain visibility.

- India has over **56 GW** installed wind power capacity
- India is the **4th largest wind energy market** globally
- Wind energy potential estimated at **1,164 GW**
- India added a record **6.1 GW** of wind capacity in FY 2025–26

Key features:

- First dedicated wind turbine supply chain portal in India
- Improves visibility across the wind energy supply chain
- Supports compliance with the **Approved List of Models and Manufacturers (ALMM)** framework
  - Facilitates:
  - Supplier discovery
  - Supplier qualification
  - Stakeholder collaboration
- Enhances export readiness of Indian manufacturers
- Supports domestic manufacturing and localisation

Kishau Multi-Purpose Dam Project

Why in news?

The Centre and six states **Himachal Pradesh, Uttarakhand, Delhi, Uttar Pradesh, Haryana, and Rajasthan** have reached a consensus to sign an MoU for implementing the **Kishau Multi-Purpose Dam Project** aimed at the **rejuvenation of the Yamuna River**.

Key details about Kishau Multi-Purpose Dam Project:

- **Location:** On the **Yamuna River** at the border of **Uttarakhand and Himachal Pradesh**
- **Type:** Multi-purpose river valley project
- **Implementing agency: Kishau Corporation Limited** (joint venture of Uttarakhand and Himachal Pradesh)
- **Objectives:**
  - Augment water supply in the Yamuna basin
  - Enhance irrigation potential
  - Generate hydropower
  - Improve environmental flows in the Yamuna River
- **Funding pattern:**
  - **90%** of the water component cost to be borne by the Central Government
  - Remaining **10%** shared among participating states
- **Significance:**
  - Expected to improve water availability for northern states
  - Supports long-term Yamuna rejuvenation efforts

Flash Facts

India Unveils Bastar Development Roadmap

Union Minister **Amit Shah** said **Bastar Division** will become the country's **most developed tribal division within five years**.

Under a scientific development roadmap, security camps will be converted into **'Shaheed Veer Gundadhur Seva Deras'** providing **banking, skill training, schools, anganwadis, and forest produce processing units**.

The plan also includes a **cooperative dairy network** in partnership with the **National Dairy Development Board (NDDB)** and support for every tribal family with a cow or buffalo.

Indian Railways Approves First Indigenous Hydrogen Train

Indian Railways approved India's **first indigenous hydrogen-powered train** for the **Jind–Sonipat route** in **Haryana**.

Hydrogen trains use **fuel cells to generate electricity**, emitting only **water vapour**, and are seen as a cleaner alternative to diesel locomotives supporting green transport goals.

AIIMS Study Shows Air Pollution Can Affect Foetal Development

A study by **All India Institute of Medical Sciences Delhi (AIIMS Delhi)** found that **PM2.5 and PM10 pollutants can cross the placental barrier**, triggering inflammation and affecting foetal growth.

The study identified disruption of **IGFBP3**, a key protein involved in placental and embryonic development, linking air pollution to risks such as **low birth weight, preterm birth, and preeclampsia**.

Maruti Suzuki Launches India's First Flex-Fuel Passenger Vehicle

Maruti Suzuki launched **India's first flex-fuel passenger vehicle**, capable of running on **ethanol-petrol blends ranging from E20 to E100**.

Flex-fuel vehicles can operate on multiple fuel blends, helping reduce **crude oil imports, emissions, and dependence on fossil fuels**, while supporting India's **ethanol blending programme and energy transition goals**.

Major Abhilasha Barak Receives UN Military Gender Advocate Award

Abhilasha Barak received the **UN Military Gender Advocate of the Year Award** for promoting the participation and empowerment of women and girls during her deployment with the **United Nations Interim Force in Lebanon (UNIFIL)**.

She is also the **first woman combat helicopter pilot in the Indian Army**, highlighting India's contribution to UN peacekeeping efforts.

PM Modi Becomes India's Longest-Serving Elected Prime Minister

Narendra Modi became **India's longest-serving elected Prime Minister**, surpassing the tenure of **Jawaharlal Nehru**.

He achieved the milestone after serving **4,399 consecutive days in office**, marking the longest uninterrupted tenure by an elected Prime Minister in India's history.

APEDA Facilitates First Export of GI-Tagged Tezpur Litchi to Dubai

The **Agricultural and Processed Food Products Export Development Authority (APEDA)** facilitated the **first export of GI-tagged Tezpur Litchi** from **Assam** to **Dubai**.

Tezpur Litchi, known for its **exceptional sweetness, bright-red colour, and distinctive aroma**, has a **Geographical Indication (GI) tag**, which helps protect its regional identity and enhances its value in international markets.

Centre Removes Excise Duty on Higher Ethanol-Blended Petrol

The Union Government has exempted **E22, E25, E27, and E30 petrol** (containing 22%, 25%, 27%, and 30% ethanol respectively) from **central excise duty** on the blending component.

The move aims to promote **ethanol-based fuels** and avoid **double taxation** when petrol and ethanol are blended. It is seen as a preparatory step for higher ethanol blends, though the government clarified that it does **not signal immediate rollout** of such fuels.

Ethanol-blended petrol is a mixture of petrol and ethanol, a biofuel produced mainly from sugarcane and other agricultural feedstocks, helping reduce crude oil imports and vehicular emissions.

Blend	Ethanol Content
E10	10% Ethanol + 90% Petrol
E20	20% Ethanol + 80% Petrol
E22	22% Ethanol + 78% Petrol
E25	25% Ethanol + 75% Petrol
E27	27% Ethanol + 73% Petrol
E30	30% Ethanol + 70% Petrol
E85	85% Ethanol + 15% Petrol

E85 fuel contains **85% ethanol and 15% petrol**. It is primarily used in **flex-fuel vehicles (FFVs)**. Recently launched in India as part of the gradual transition towards higher ethanol blends.

China Relaxes Hukou System to Boost Urban Inclusion

China is reforming its **Hukou (household registration) system** to give migrant workers better access to **education, healthcare, housing, and social welfare** in cities.

Hukou is a household registration system that links citizens to their place of birth, often restricting migrants' access to public services in other cities. China is pursuing **greater inclusion without fully abolishing the system**.

National Task Force on Student Mental Health & Prevention of Student Suicides

The Supreme Court-appointed **National Task Force (NTF) on Mental Health of Students and Prevention of Student Suicides** has submitted its interim findings, saying that there is **no foolproof mechanism to completely prevent student suicides**, but recommended a major overhaul of campus support systems.

The NTF called for **institutional mental health policies, professional counselling services, early identification of distress, anti-discrimination measures, and stronger grievance-redress mechanisms** in educational institutions.

Telangana Launches Free Breakfast & Milk Scheme for Students

Telangana launched the **Breakfast and Milk Scheme** for students from **pre-primary to Class 12** in government schools.

The scheme will benefit around **29 lakh students** and aims to **reduce classroom hunger, improve nutrition, and enhance school attendance**, with an allocation of **₹740 crore**.

Centre Bans Over-the-Counter Sale of Medicinal Cough Syrups

The Union Government amended the **Drugs Rules, 1945**, making **medicinal cough syrups prescription-only drugs**. Their sale without a doctor's prescription is no longer permitted.

The move aims to strengthen drug safety and follows concerns over **adulterated cough syrups linked to child deaths in India and abroad**. However, **cough tablets, pills, and lozenges** remain available over the counter.

Maharashtra Approves High-Energy Medical Cyclotron Project in Nagpur

The **Maharashtra** Cabinet approved a **₹300-crore High-Energy Medical Cyclotron Project (HEMCP)** in **Nagpur** to establish a **Radiopharmaceutical Innovation Hub**.

The project will ensure local production of **radioisotopes** used in **PET-CT scans and nuclear medicine**, improving cancer diagnosis and treatment across Central India.

Cyclotron: A particle accelerator that produces medical radioisotopes used in diagnostic imaging and cancer care.

Government Bans Telegram Over Misuse During NEET Leak Controversy

The government imposed a temporary nationwide ban on **Telegram** involving **Section 69(A) of the Information Technology (IT) Act, 2000** , citing misuse of platform features to spread **fake question paper leak claims** during the **NEET examination**.

According to the **National Testing Agency (NTA)**, bad actors exploited Telegram's **channel synchronisation and post-editing features** to create misleading evidence of paper leaks, triggering panic among students.

News to MCQ's

1. Consider the following statements regarding suo motu cognisance in India:

1. The Supreme Court can initiate proceedings without a formal petition being filed before it.
2. Article 235 of the Constitution relates to the control of High Courts over subordinate courts.
3. In Sahara India Real Estate Corporation v. SEBI (2012), the Supreme Court recognised postponement orders to protect fair trial rights.

Which of the statements given above are correct?

(a) 1 and 2 only (b) 2 and 3 only
(c) 1 and 3 only (d) 1, 2 and 3

2. Which of the following activities are prohibited under the Supreme Court's draft AI regulations for courts?

1. Witness profiling
2. Court transcription
3. Bail eligibility assessment through AI
4. Translation of judgments

Select the correct answer:

(a) 1 and 2 only (b) 1 and 3 only
(c) 1, 2 and 3 only (d) 1, 3 and 4 only

3. Consider the following statements:

1. Rare earth elements are essential inputs for sectors such as electronics, renewable energy and advanced manufacturing.
2. Processing and refining capacity are important components of critical mineral supply chains.
3. The Quad Critical Minerals Initiative is intended to establish a common currency arrangement among Quad countries.

Which of the statements given above are correct?

(a) 1 and 2 only (b) 2 only
(c) 1 and 3 only (d) 1, 2 and 3

4. Consider the following statements regarding the India–Oman Comprehensive Economic Partnership Agreement (CEPA):

1. India receives 100% duty-free access in Oman on more than 98% of its tariff lines.
2. The agreement includes provisions relating to services and professional mobility.
3. Tariff concessions under the agreement extend to all agricultural products exported from India.

Which of the statements given above are correct?

(a) 1 and 2 only (b) 2 only
(c) 1 and 3 only (d) 1, 2 and 3

5. With reference to Free Trade Ports (FTPs), consider the following statements:

1. Goods entering Free Trade Ports are always exempt from all forms of taxation.
2. They are exclusively meant for export-oriented manufacturing industries.
3. They often promote re-export trade and logistics activity.

Which of the statements given above is/are correct?

(a) 3 only (b) 2 only
(c) 1 and 2 only (d) 1, 2 and 3

6. Consider the following statements regarding depreciation of the Indian rupee:

1. A persistent current account deficit can increase downward pressure on the rupee.
2. Foreign Portfolio Investment (FPI) outflows may increase demand for U.S. dollars in the domestic forex market.
3. The Reserve Bank of India can permanently prevent rupee depreciation through forex intervention.

Which of the statements given above are correct?

(a) 1 and 2 only (b) 2 and 3 only
(c) 1 and 3 only (d) 1, 2 and 3

7. Consider the following statements:

1. India has generally kept sensitive agricultural commodities outside major trade liberalisation commitments.
2. Trade agreements may include provisions relating to standards, certification and quarantine procedures.

3. Australian agriculture is dominated by subsistence farming practices.

Which of the statements given above are correct?

(a) 1 and 2 only (b) 2 only

(c) 1 and 3 only (d) 1, 2 and 3

8. Consider the following statements:

1. Operational Technology (OT) systems are used for monitoring and control of industrial processes and infrastructure systems.
2. Industrial Internet of Things (IIoT) systems use connected sensors, controllers and communication networks in industrial operations.
3. Cybersecurity threats to critical infrastructure arise only from vulnerabilities in software systems.

Which of the statements given above are correct?

(a) 1 and 2 only (b) 2 only

(c) 1 and 3 only (d) 1, 2 and 3

9. Consider the following statements:

1. Syngas produced through coal gasification can be used for production of methanol and ammonia.
2. Indian coal is characterised by relatively high ash content.
3. Fluidised-bed gasification technology is unsuitable for Indian coal conditions.

Which of the statements given above are correct?

(a) 1 and 2 only (b) 2 only

(c) 1 and 3 only (d) 1, 2 and 3

10. Consider the following statements:

1. Syngas produced through coal gasification can be used for production of methanol and ammonia.
2. Indian coal is characterised by relatively high ash content.
3. Fluidised-bed gasification technology is unsuitable for Indian coal conditions.

Which of the statements given above are correct?

(a) 1 and 2 only (b) 2 only

(c) 1 and 3 only (d) 1, 2 and 3

11. Consider the following statements regarding the Fully Accessible Route (FAR):

1. It permits non-resident investment in specified Government Securities without investment ceilings.
2. Sovereign Green Bonds can be notified under FAR.
3. FAR applies only to Treasury Bills.

Which of the statements given above is/are correct?

(a) 1 and 2 only (b) 2 only

(c) 1 and 3 only (d) 1, 2 and 3

12. Consider the following statements regarding the Bloomberg Global Aggregate Bond Index (BGAI):

1. It is a global benchmark that tracks investment-grade bonds across countries.
2. Inclusion of a country's government securities in the index can attract passive foreign investment flows.

Which of the statements given above is/are correct?

(a) 1 only (b) 2 only

(c) Both 1 and 2 (d) Neither 1 nor 2

13. Consider the following statements regarding Floating Solar Photovoltaic (FSPV) systems:

1. Floating solar systems are installed on water bodies such as reservoirs and lakes.
2. Floating solar projects require acquisition of large land parcels for deployment.
3. The National Institute of Solar Energy (NISE) has estimated India's floating solar potential at over 100 GW.

Which of the statements given above are correct?

(a) 1 and 2 only (b) 1 and 3 only

(c) 2 and 3 only (d) 1, 2 and 3

14. Consider the following statements regarding Foreign Currency Non-Resident (Bank) [FCNR(B)] Deposits:

1. FCNR(B) deposits are maintained in designated foreign currencies rather than Indian rupees.
2. FCNR(B) deposits protect depositors from exchange-rate fluctuations during the deposit tenure.

Which of the statements given above is/are correct?

(a) 1 only (b) 2 only

(c) Both 1 and 2 (d) Neither 1 nor 2

15. Consider the following statements:

Statement I: The Zwan-Wolf effect is associated with redistribution of charged particles in the solar wind near planetary magnetic boundaries.

Statement II: Recent observations suggest that even planets without a strong global magnetic field may exhibit the Zwan-Wolf effect.

Which one of the following is correct in respect of the above statements?

(a) Both Statement I and Statement II are correct and Statement II explains Statement I

(b) Both Statement I and Statement II are correct but Statement II does not explain Statement I

(c) Statement I is correct but Statement II is incorrect

(d) Statement I is incorrect but Statement II is correct

16. Which of the following are potential concerns associated with large-scale deployment of AI agents?

1. Increased bot-driven internet traffic
2. Concentration of user data with major technology firms
3. Greater transparency in algorithmic decision-making
4. Behavioural profiling of users

Select the correct answer using the code given below:

(a) 1, 2 and 4 only (b) 1 and 3 only

(c) 2 and 3 only (d) 1, 2, 3 and 4

17. With reference to Post-Quantum Cryptography (PQC), consider the following statements:

1. Post-Quantum Cryptography requires quantum computers for secure encryption and decryption processes.
2. Quantum computers pose a significant threat primarily to public-key cryptographic systems currently in use.
3. Lattice-based cryptographic systems are being explored as possible alternatives under PQC frameworks.

Which of the statements given above is/are correct?

(a) 2 and 3 only (b) 1 only

(c) 1 and 2 only (d) 1, 2 and 3

18. Consider the following statements regarding pyroprocessing:

1. It is a high-temperature process used in industries such as cement manufacturing and metallurgy.
2. In nuclear applications, pyroprocessing involves electrochemical separation in molten salts.
3. Roasting of sulphide ores is a form of pyroprocessing.

Which of the statements given above are correct?

(a) 1 and 2 only (b) 2 and 3 only

(c) 1 and 3 only (d) 1, 2 and 3

19. Consider the following statements regarding IMI-resistant mustard hybrids:

1. They have been developed through mutation breeding.
2. They are genetically modified crops developed through insertion of foreign genes.
3. They possess a modified Acetolactate Synthase (ALS) enzyme that enables tolerance to imidazolinone herbicides.

Which of the statements given above are correct?

(a) 1 and 3 only (b) 2 and 3 only

(c) 1 only (d) 1, 2 and 3

20. Consider the following practices used by online platforms:

1. Displaying a countdown timer to create pressure for immediate purchase.
2. Pre-selecting paid add-on services during checkout.
3. Making cancellation of subscriptions significantly harder than enrolment.

The above practices are examples of:

(a) Algorithmic bias

(b) Dark patterns

(c) Deepfake technology

(d) Behavioural advertising

21. Consider the following practices used by online platforms:

1. Displaying a countdown timer to create pressure for immediate purchase.
2. Pre-selecting paid add-on services during checkout.

3. Making cancellation of subscriptions significantly harder than enrolment.

The above practices are examples of:

(a) Algorithmic bias
(b) Dark patterns
(c) Deepfake technology
(d) Behavioural advertising

22. Consider the following statements regarding Earth's magnetic field:

1. It is generated mainly due to the movement of electrically conducting materials in the outer core.
2. It protects the Earth from charged particles emitted by the Sun.
3. Sudden changes in outer core flow may influence geomagnetic variations.

Which of the statements given above is/are correct?

(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3

23. Which of the following Fundamental Rights did the Supreme Court associate with walking on footpaths?

1. Freedom of Speech and Expression
2. Freedom of Assembly
3. Freedom of Association

Select the correct answer:

(a) 1 only
(b) 1 and 2 only
(c) 2 and 3 only
(d) 1, 2 and 3

24. Consider the following statements regarding Foreign Currency Non-Resident (Bank) [FCNR(B)] Deposits:

1. FCNR(B) deposits are maintained in designated foreign currencies rather than Indian rupees.
2. FCNR(B) deposits protect depositors from exchange-rate fluctuations during the deposit tenure.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

25. Consider the following characteristics of a digital commerce model:

1. The intermediary controls product pricing and marketing.
2. Customer orders are transmitted to a third-party supplier for fulfilment.
3. The intermediary does not maintain inventory or warehouses for the products sold.
4. The model significantly lowers entry barriers for online entrepreneurship.

The above characteristics best describe:

(a) Inventory-led e-commerce model
(b) Affiliate marketing model
(c) Dropshipping model
(d) Franchise retail model

Answers

1. d 2. b 3. a 4. a 5. a 6. a 7. a 8. a 9. a 10. a 11. a 12. c
13. b 14. c 15. b 16. a 17. a 18. d 19. a 20. b 21. b 22. d 23. d 24. c
25. c

Mains Practice Questions

1. "Constitutional rights must evolve alongside changing urban realities." In this context, examine the constitutional basis and governance implications of recognising the Right to Walk as part of Article 21. **(10 Marks | 150 words)**

2. Artificial Intelligence can bridge the last-mile governance gap but cannot replace institutional accountability. Discuss. **(10 Marks | 150 words)**

3. International rivers and maritime spaces are emerging as important arenas of strategic competition. Analyse the challenges in governing international waters. **(10 Marks | 150 words)**

4. India's energy transition must balance sustainability, affordability and energy security. Discuss in the context of E100 blending and global geopolitical uncertainties. **(15 Marks | 250 words)**

5. Artificial intelligence and autonomous systems are transforming the character of modern warfare. Examine the opportunities and ethical concerns associated with their deployment. **(15 Marks | 250 words)**

6. Effective solid waste management requires behavioural change as much as technological interventions. Discuss. **(10 Marks | 150 words)**

7. India's counter-terror strategy has gradually shifted from reactive policing to an integrated national security approach. Analyse. **(15 Marks | 250 words)**

8. Scientific progress cannot be sustained without social inclusion. Discuss in the context of gender inequality in India's research ecosystem. **(10 Marks | 150 words)**

9. "The true measure of development lies not merely in economic growth but in the health, education and dignity of its people." Examine this statement in the light of the findings of NFHS-6. **(15 Marks | 250 words)**

10. Climate Action Plans have become central to India's climate governance. However, their effectiveness depends on implementation rather than policy intent. Discuss. **(15 Marks | 250 words)**

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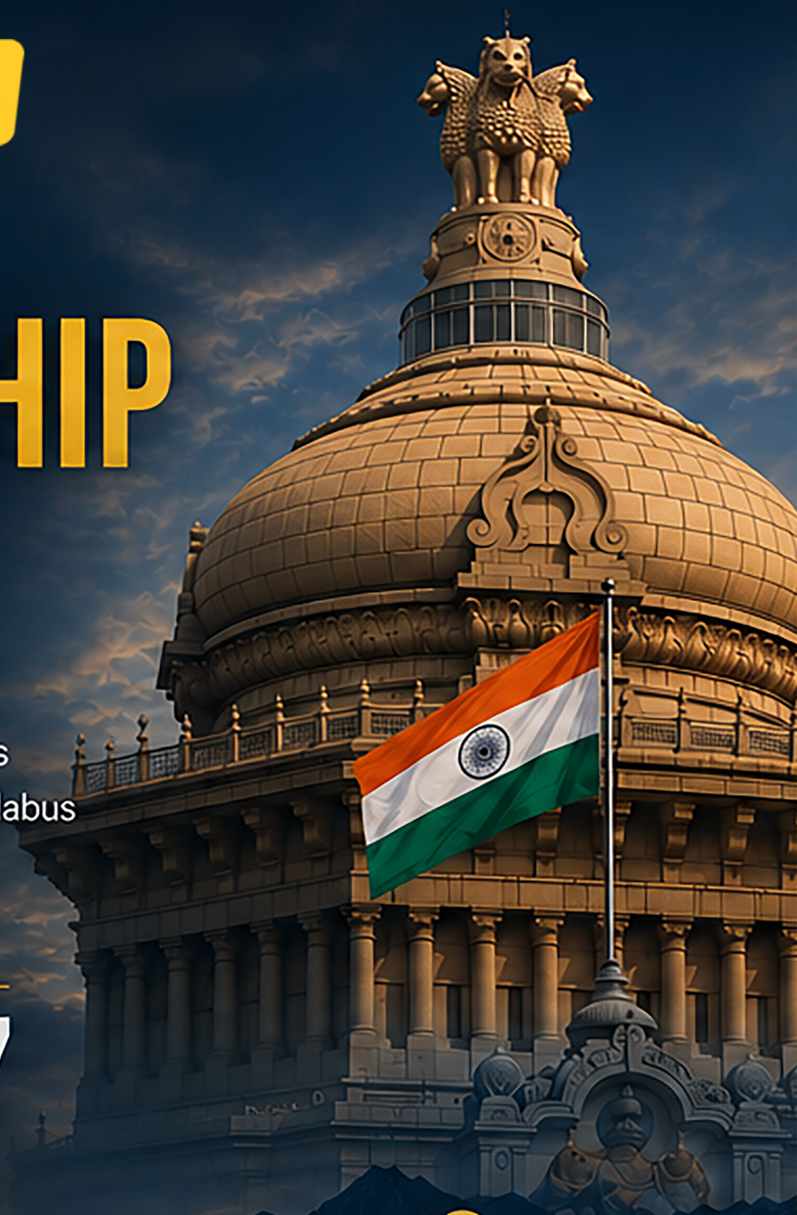

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